FA-00-154983

JUN 2 2 2001
MICROFILMED

18

CITY OF

PORTLAND, OREGON

OFFICE OF PLANNING AND DEVELOPMENT REVIEW
1900 SW 4th Ave, Suite 5000
Portland, OR 97201

MULTNOMAH COUNTY

FACILITY PERMIT

00-154893-REV-01-FA

Site Address: 805 SW BROADWAY AVE

Issued: 10/17/00

TMT Mgmt / FOX TOWER - BLACK HELTERLINE LLP 19TH FL. T.I.

PROJECT INFORMATION		Occ. Group	Const. Type
Building	Alteration	B	I-FR

Project Description: T1S2/PR# -805-BLACK HELTERLINE, REVISE ANCHOR ANDRAIL SYSTEM TAB IS THE INSTALLER OF THEIR OWN SYSTEM

APPLICANT	ZIMMER, GUSUL, FRASCA *MARK BOOTH*	Phone	(503) 224-3860
OWNER	FOX TOWER L L C	Phone	
CONTRACTOR	NONE	Phone	

Project Details	
Alarm System Required?	Yes
Code Edition (Year)	1998
Electrical Specialty?	Yes
Plumbing Specialty?	Yes
Return Plans/Permit to?	MARK BOOTH
Sprinkler System Required?	Yes

Project Details	
Building Specialty?	Yes
Code Edition Commercial (Year)	1999
Mechanical Specialty?	Yes
Project Reference Number	805-BLACK HELTE
Sewer District	City of Portland
Water District	City of Portland

CITY CONTACT

E-Mail:

Phone:

Fax: (503) 823-4172

INSPECTION REQUEST PHONES NUMBERS

Building/Trade Inspections - Call Before 6:00 AM: **(503) 823-7000**

TDD: (503) 823-6868

IVR Inspection Request Number: 2039701

Architecture/Planning/Interior Design

ZIMMER GUNSUL FRASCA PARTNERSHIP
320 S.W. Oak Suite 500 Portland, Oregon 97204
Office: 503/224-3860 Fax: 503/224-2482

TRANSMITTAL NOTICE

SHIELA LOWE
FACILITIES PERMIT PROGRAM
OFFICE OF PLANNING & DEVELOPMENT REVIEW
CITY OF PORTLAND
1900 SW 4TH AVENUE
PORTLAND, OR 97204

DATE: October 11, 2000
PROJECT NO.: P71147.01
PROJECT NAME: Black Helterline L.L.P.

TRANSMITTED HEREWITH:

NO. OF COPIES	DATED	TITLE
2		Tab's Structural Information, prepared by kpff

REMARKS:

Re: FPP #805-Black Helterline ; Application No. 00-154893FA
For Mike Walkiewicz.
This information was prepared by kpff under separate agreement to Tab.
Tab is the installer of their own system. This information is to address concern's Mike Walkiewicz had about Tab's anchors and rails; we are forwarding ourselves to help keep the project on track.

cc: Sarah Gary/Black Helterline ; Bill Drinkward/HCCO ; Dale Pearce/TMT ; Karl Pfeifer/OPDR

IF ENCLOSURES RECEIVED ARE NOT AS LISTED ABOVE, KINDLY NOTIFY AT ONCE.

MASTER FILE w/ encl.
ROUTING

BY: _____
Mark E. Booth
Associate Partner

00-154893 FA
REV01

kpff Consulting Engineers

BUREAU OF BUILDINGS
CITY OF PORTLAND
THIS DRAWING IS APPROVED FOR CONSTRUCTION;
ERRORS OR OMISSIONS DO NOT IMPLY APPROVAL
TO VIOLATE ANY APPLICABLE CODE OR ORDINANCE.
FACILITY #
BLDG. PERMIT # 00-154893 REV 01 FA
MECH PERMIT
DATE 10-17-00
REVIEWED BY
THESE [illegible] SPECIFICATIONS SHALL BE ON
JOB [illegible]

October 6, 2000

Mr. Mark Booth
Zimmer Gunsul Frasca Partnership
320 SW Oak Street Suite 500
Portland, OR 97204

RE: Black Helterline

Dear Mark:

Attached please find sketch SK-1, Tab drawings Tab-1 through Tab-3, and calculation sheets R1 through R13, dated October 6, 2000, which verify the structural adequacy of the rails of the Tab condensed storage system to be installed in Black Helterline's tenant space in the Fox Tower. Please reference KPFF drawing S1.0 dated September 11, 2000 for rail and existing structure layout, and KPFF calculations dated September 11, 2000, for verification of existing structure for storage loads. Design is based on the requirements of the 1998 Oregon Structural Specialty Code.

If you have any questions or need further information, please call.

Sincerely,

Karen A. Sauer

Karen A. Sauer, P.E.

Attachments
200163/01-calcletter-zgf-100600.doc

STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
10542
OREGON
JULY 13, 1979
M. BRADLEY [illegible]
EXPIRES: 12-31-00

111 S.W. Fifth Avenue, Suite 2500 Portland, OR 97204-3628 (503) 227-3251 Fax (503) 227-7980
Seattle Portland San Francisco Los Angeles Irvine San Diego Phoenix

kpff

BLACK HELTERLINE

STRUCTURAL CALCULATIONS

KPFF PROJECT NO. 200163.01

October 6, 2000

Submitted To:

Zimmer Gunsul Frasca Partnership
320 SW Oak Street Suite 500
Portland, OR 97204

Submitted By:

KPFF Consulting Engineers
111 SW Fifth Avenue Suite 2500
Portland, OR 97204-3628

kpff Consulting Engineers

October 6, 2000

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Zimmer Gunsul Frasca Partnership
320 SW Oak Street Suite 500
Portland, OR 97204

RE: Black Helterline

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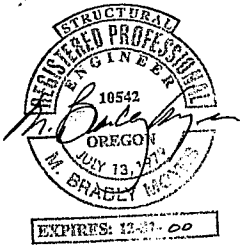
If you have any questions or need further information, please call.

Sincerely,

Karen A. Sauer

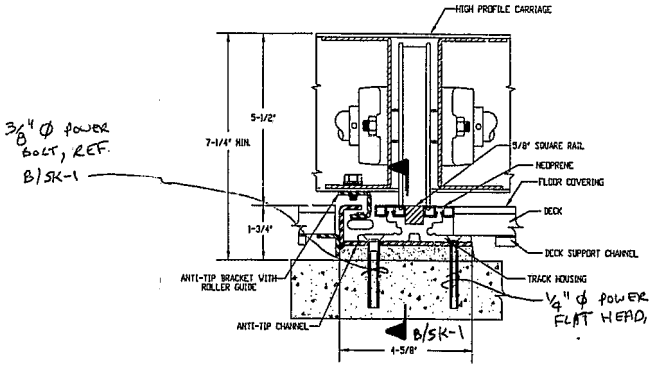
Karen A. Sauer, P.E.

Attachments
200163/01-calcletter-zgf-100600.doc



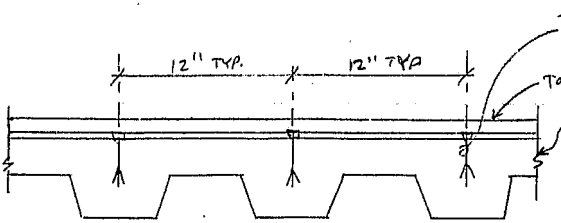
111 S.W. Fifth Avenue, Suite 2500 Portland, OR 97204-3628 (503) 227-3251 Fax (503) 227-7980
Seattle Portland San Francisco Los Angeles Irvine San Diego Phoenix

kpff Consulting Engineers Portland, Oregon	Project: Black Helterline - Tab Rails	By: kas	Sheet No.: SK-1
	Location: PORTLAND, OR	Date: 10/6/00	
	Client:	Revised:	Job No: 200163.01
		Date:	



A / SK-1 Tab Anti-Tip Rail Section

N.T.S.



B / SK-1 RAIL ATTACHMENT

1 1/2" = 1'-0"

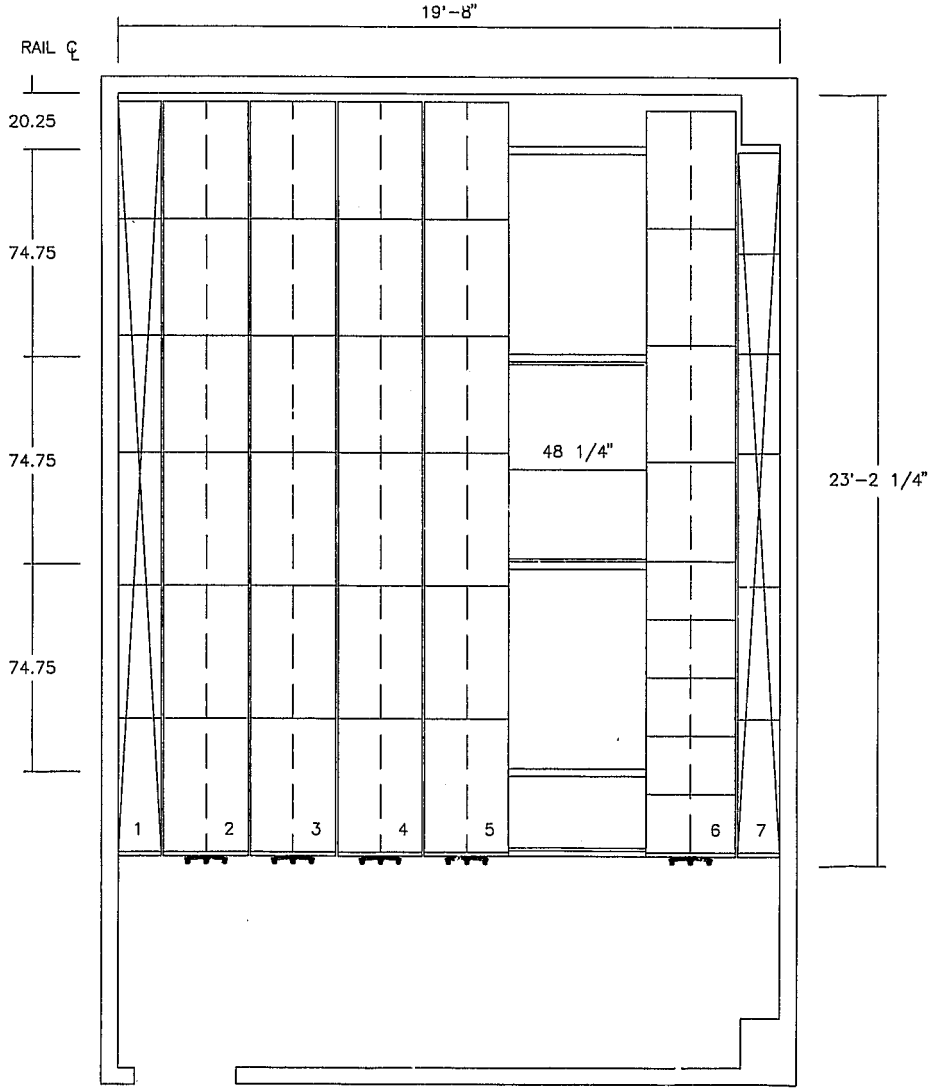
NOTES:

1. ALL (4) RAILS SHALL BE Tab Anti-Tip Rails. ALTERNATE ANTI-TIP ORIENTATION.
2. Tab TO COORDINATE LOCATION OF LOW DECK FLUTE W/ CONTRACTOR.
3. 3/8" ϕ POWER-BOLT INSTALLATION SHALL BE SPECIAL-INSPECTED.

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 10542 OREGON JULY 13, 1979 M. BRADLY MOYES

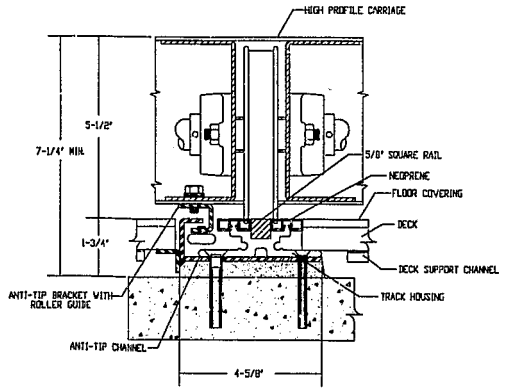
EXPIRES: 12-31-00

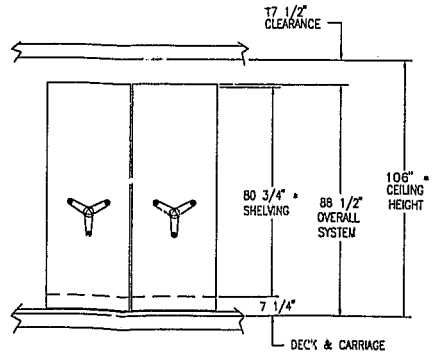
TAB-1

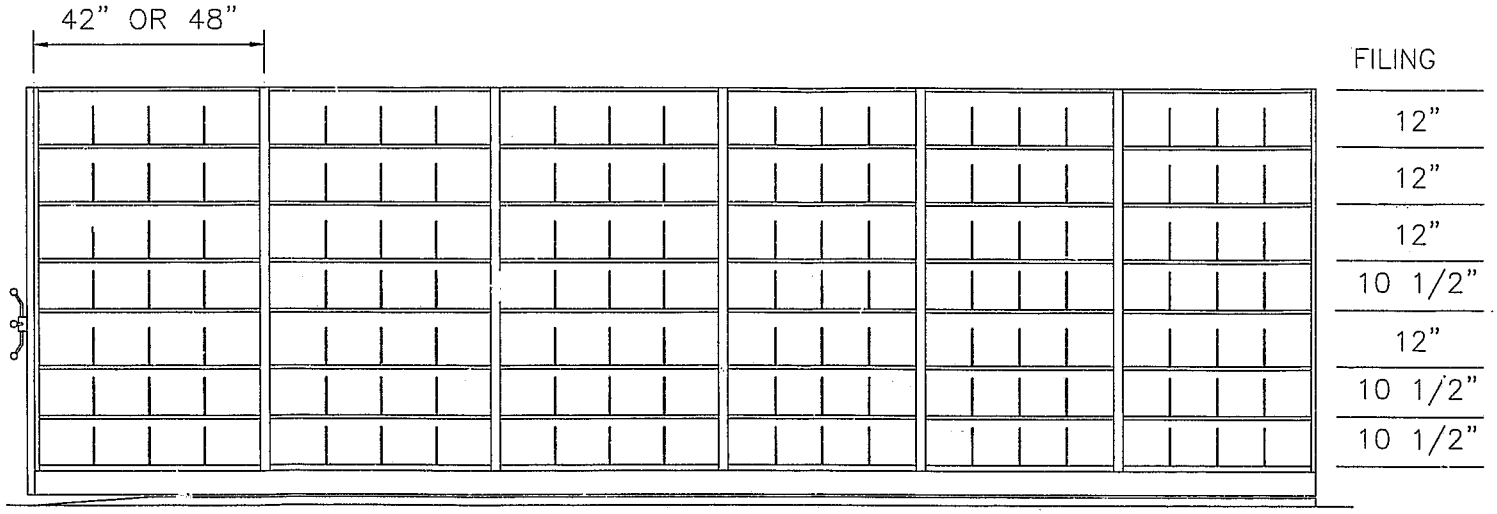


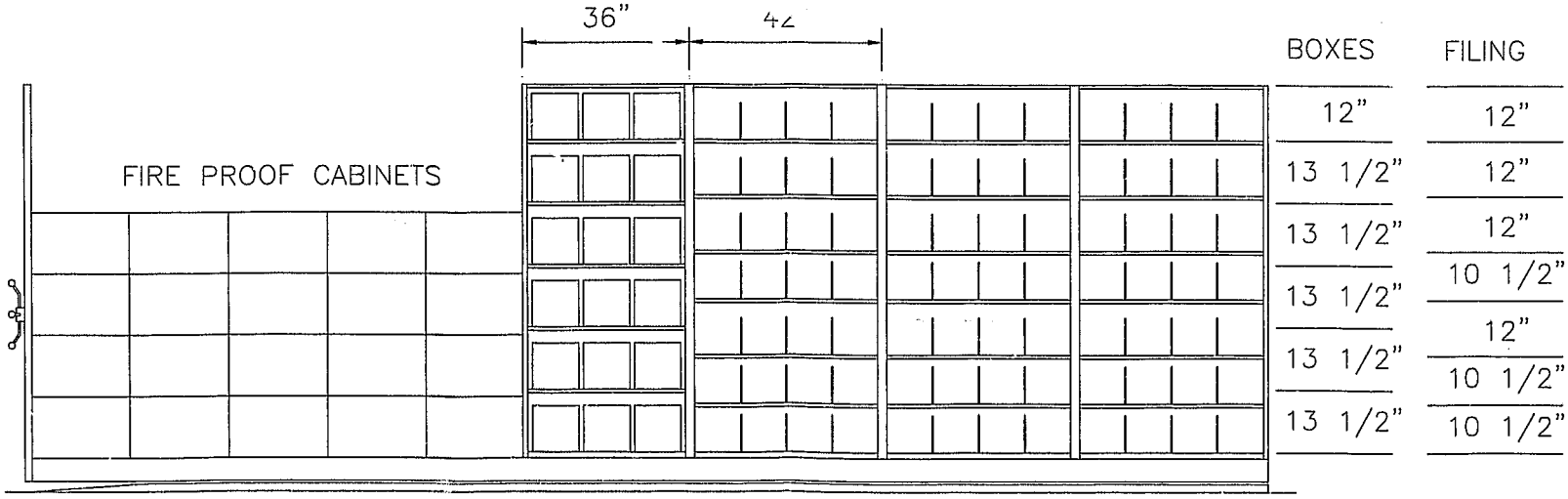
NOTES:

1. ALL STARRED (*) DIMENSIONS MUST BE VERIFIED. ANY CHANGES MAY BE CAUSE FOR SYSTEM TO BE REDRAWN AND/OR REPRICED.
2. SYSTEM:
   TYPE: MECHANICAL (9:1) – W/ANTI-DRIFT BRAKE
   CARRIAGE: HIGH PROFILE (1000#)
   TRACK: UNIVERSAL
   DECK: TAB-TRAC
   END PANELS: TAB-TRAC – SELF EDGE
3. SHELVING: TENNSCO @
   15"D x 36", 42" & 48"W x 80-3/4"H *
   30"D x 36", 42" & 48"W x 80-3/4"H *
   FIRE PROOF CABINETS @
   30 1/2"D x 20 3/4"W x 53-3/4"H *
   31 1/2"D x 20 7/8"W x 52-5/8"H *
4. ALL SHELVING STARTER & END UNITS MUST HAVE CLOSED UPRIGHTS W/ANGLE OR "L" TYPE POSTS.
5. CARRIAGE SIZES:
   (1) FIXED @ 22'-6 1/4" Lg x 15 1/4" (#1)
   (1) FIXED @ 21'-0 1/4" Lg x 15 1/4" (#7)
   (4) MOVABLE @ 22'-6 1/4" Lg x 30 1/4" (#2-5)
   (1) MOVABLE @ 22'-3 1/4" Lg x 31 3/4" (#6)
6. MINIMUM CLEARANCE REQ'D ABOVE A MECHANICAL SYSTEM: 3"





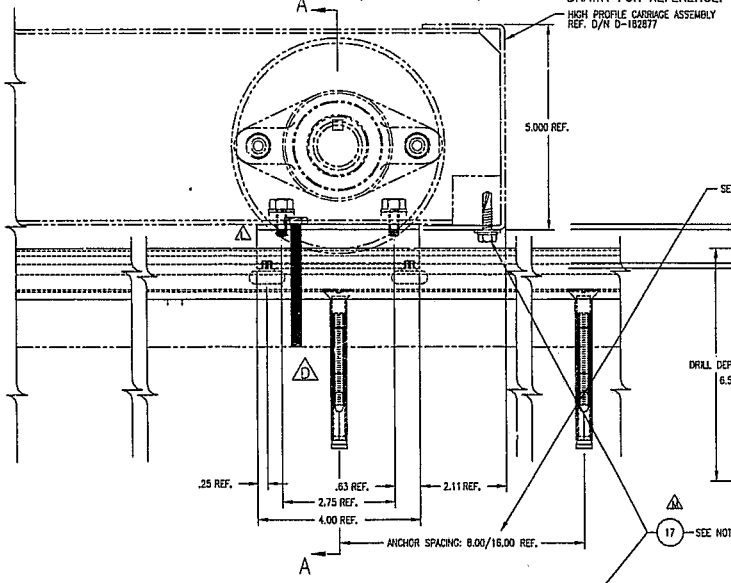




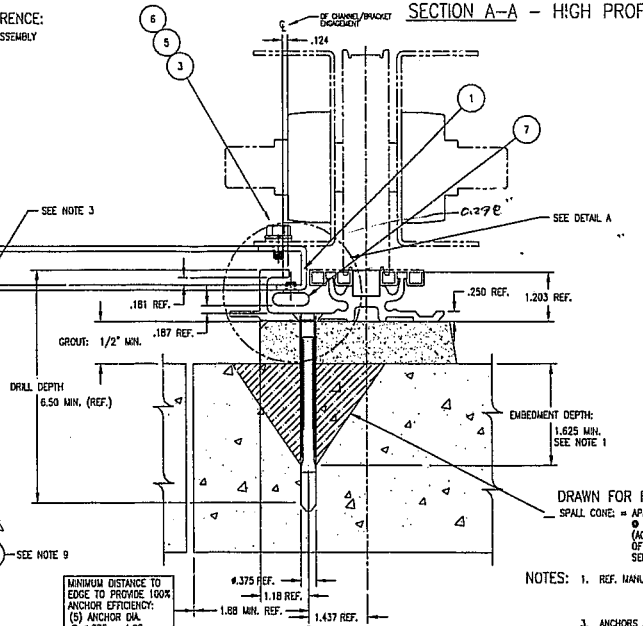
IN ORDER NOT TO SEE THE BACK OF THE END PANEL
THE SHELVING CAN BE MOVED UP FRONT WITH THE CABINETS IN THE BACK.

MB57de

CARRIAGE-MOUNTED ANTI-TIP PARTS (HIGH PROFILE)



SECTION A-A - HIGH PROFILE



STANDARD ANTI-TIP REQUIREMENT

ANTI-TIP IS REQUIRED WHEN SHELVING DEPTH IS LESS THAN 24.00, OR WHEN THE FOLLOWING CONDITION EXISTS:

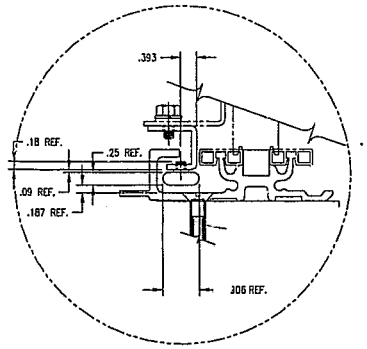
A = B/C (SOLVE FOR "A")

WHERE:

B = CARRIAGE WIDTH = SHELVING DEPTH + 1/4"

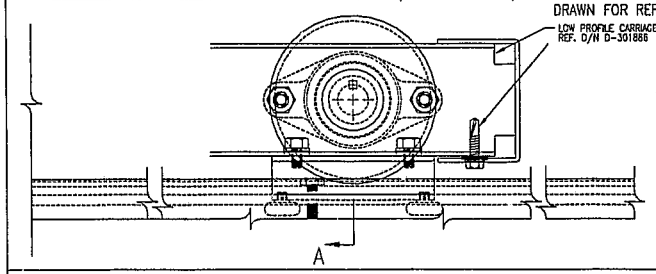
C = SYSTEM HEIGHT = SHELVING HEIGHT + CARRIAGE HEIGHT + 1/2"

IF "C" IS 96.00 OR GREATER, AND "A" IS LESS THAN 0.30

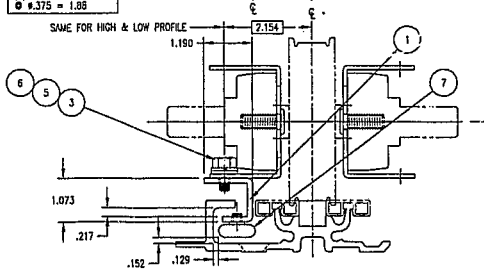


DETAIL A

CARRIAGE-MOUNTED ANTI-TIP PARTS - (LOW PROFILE)



SECTION A-A - LOW PROFILE



NOTES:

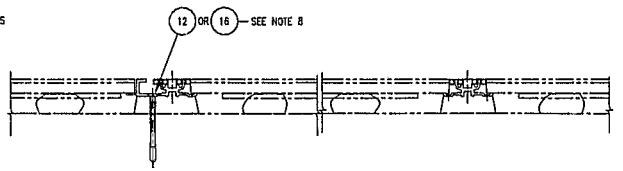
1. REF. MANUFACTURER'S SPECIFICATIONS; I.E., RAMSET ANCHORS, FOR ADDITIONAL ANCHORING SPECIFICATIONS.
3. ANCHORS ARE TO BE INSTALLED IN THE ø.781 C'SK HOLES, 17.50" O.C. I.E., (6) ANCHORS REQUIRED PER 8-FOOT TRACK SECTION.
4. ANTI-TIP ANCHOR SELECTION CRITERIA:
   CONCRETE FLOOR: GSA FEDERAL SPECIFICATION FF-S-325, GROUP II, TYPE 3, CLASS 3 ACTUAL ANCHOR LENGTH TO BE DETERMINED AFTER GRADE OF FLOOR IS KNOWN.
   ON, OR IN LEVEL COMPUTER FLOOR: ACTUAL ANCHOR LENGTH TO BE DETERMINED AFTER FLOOR TYPE AND THICKNESS ARE KNOWN.
   ON NON-LEVEL COMPUTER FLOOR: ACTUAL ANCHOR LENGTH TO BE DETERMINED AFTER GRADE OF FLOOR, AND FLOOR TYPE AND THICKNESS ARE KNOWN.
5. STRUCTURAL AND ANCHORING REQUIREMENTS FOR SEISMIC APPROVAL SUPERCEDE THIS DRAWING.
6. CABINETS ARE ANCHORED TO A REGULAR WEIGHT CONCRETE FLOOR SLAB ON EARTH GRADE HAVING A MINIMUM THICKNESS OF 4" AND A MINIMUM ULTIMATE STRENGTH OF 2000 PSI AT 28 DAYS
7. CONCRETE ANCHOR TEST STANDARDS- HARDROCK OR LIGHTWEIGHT CONCRETE

ANCHOR DIAMETER (IN.)	WEDGE LOAD (LBS.)	TORQUE (FT-LBS.)
3/8	1,100	25
1/2	2,000	50
5/8	3,390	80
3/4	3,700	150

8. ITEM 12 USED IN SEISMIC/R-NUMBER INSTALLATIONS ONLY; ITEM 16 USED FOR ALL OTHER APPLICATIONS.
9. SEATING TORQUE = 125 ±10% IN-LBS. REF. D301886 AND D182877 FOR PILOT HOLE LOCATION

SECTION B - B - "ON STANDARD FLOOR" QUARTER SCALE

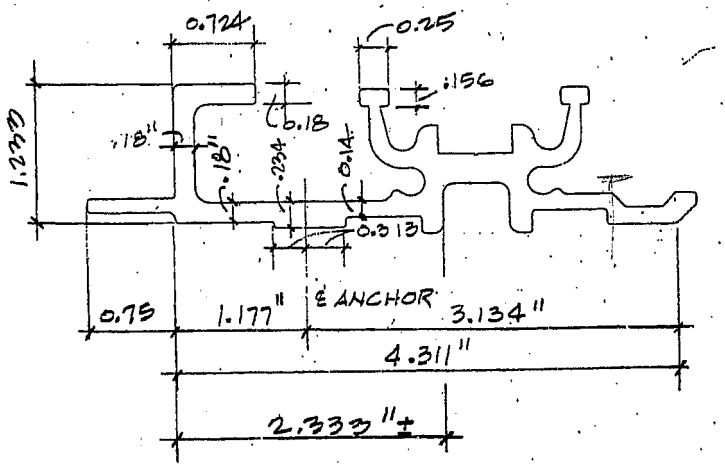
REF. SIDE VIEW (SHEET 2)
REF. ALSO: ALTERNATE FLOOR TYPES



CHG.	DESCRIPTION	DATE
A	REMOVED PEMS 8-11 & NOTE 2 REVISED EXTRUSION PER 3808	11-5-97 WCS

MODEL NO. - M606
TAB PRODUCTS CO.
PALO ALTO, CALIFORNIA
TITLE - ANTI-TIP - UNIVERSAL TRACK
MATERIAL - SEE B.O.M.
TOLERANCES - .XX ± .03 .XXX ± .010 ANGLES ± 0° 30' UNLESS OTHERWISE SPECIFIED
SCALE - 3/4"=1" DATE - 2-25-98
DRAWN BY - L.L.L CHECKED BY -
DRAWING NO. - D-301926 SHEET 1 OF 2 (A)

3017GA.dg



Tab Anti-Tip Rail Section

kpff Consulting Engineers	Project Black Helterline - Tall rails	By KAS	Sheet No. R1
Portland, Oregon	Location	Date 10/2/00	
	Client	Revised	Job No
		Date	

Seismic Force:

UBC 97 Table 16-O 2E. Permanent floor-supported cabinets

$a_p = 1.0$

$R_p = 3.0$

Section 1632.2 (32-2) 19th floor of 25

$$F_p = \frac{a_p C_a I_p}{R_p}\left(1 + 3\frac{h_x}{h_n}\right) W_p$$

$$= \frac{1.0\,(0.36)(1.0)}{3.0}\left(1 + 3\times\frac{19}{25}\right) W_p$$

$$= 0.39 W_p \text{ factored load}$$

$/1.4 = 0.28 W_p$ working stress

Check uplift

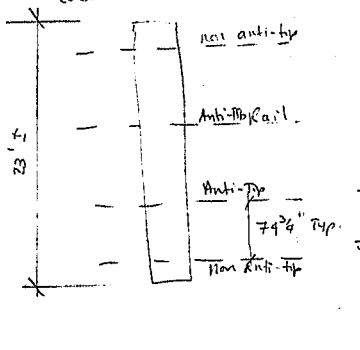
Consider one row of cabinets

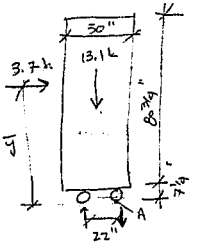
Total system wt. = 65,685#

wt per row = $\frac{65,685}{5}$ = 13,137#

$V = 0.28 \times 13,137$ = 3693#

two wheels per rail





$\bar{y} = 7\frac{1}{4} + \frac{80\frac{3}{4}}{2} = 47.6"$

Moments about pt. A bot of wheel

$M_{ot} = 3.7(47.6") = 176$ k-in

$M_{res} = 13.1k(11") = 144$ k-in

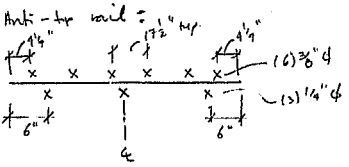
OT is possible

$T_{net} = \frac{176 - 144}{22} = 1.44k$ for whole row

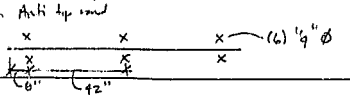
$T_{net} = \frac{1.44}{2} = 0.72$ k per anti-tip rail

Anchors per 8' rail segment:

Anti-tip rail:

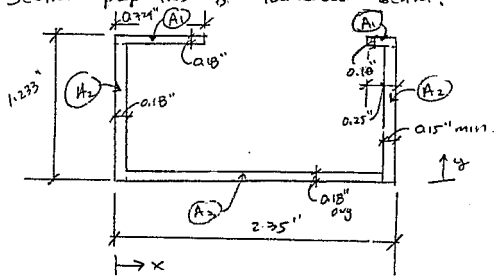


non Anti-tip rail



kpff Consulting Engineers Portland, Oregon	Project Blade H - Tab	By kas	Sheet No. A 2
	Location	Date 10/3/00	
	Client	Revised	Job No.
		Date	

Section properties of idealized beam:



	A_i	$\bar{y}_i$	$A\bar{y}_i$
A_1	$(0.724+0.25)\times 0.18 = 0.1753$	1.193	0.2009
A_2	$1.053\times(0.18+0.15) = 0.3475$	0.5265	0.1830
A_3	$2.02\times 0.18 = 0.3636$	0.09	0.03272
	0.8864		0.4161

$$\bar{y} = \frac{0.4161}{0.8869} = 0.469"$$

$$I_x = \frac{(1.053)^3(0.18+0.15)}{12} + 0.3475(0.5265-0.469)^2 + 0.1753(1.193-0.469)^2 + 0.3636(0.469-0.09)^2 = 0.165 \text{ in}^4$$

$$S_{bot} = \frac{0.165}{0.469} = 0.352 \text{ in}^3 \qquad S_{top} = \frac{0.165}{1.233-0.469} = 0.216 \text{ in}^3 \text{ controls}$$

allowable stress of Aluminum 6005-T5

$F_{cy} = F_{ty} = 35$ ksi ref. UBC Tbl 20-11-A

F.S. = 1.65 Tbl 20-1-D

$F_b = \frac{35}{1.65} = 21.2$ ksi

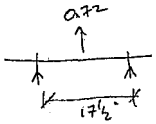
$\times 4/3 = 28.3$ ksi seismic

kpff Consulting Engineers Portland, Oregon	Project Black H.- Tab	By kas	Sheet No. R3
	Location	Date 10/2/00	
	Client	Revised	Job No.
		Date	

Check Rails for sting loading

$S_{mm} = 0.216\ in^3$

Alum. 6005-T5
$F_y = 35\ ksi$ $F.S. = 1.65$ $F_b = 21\ ksi$

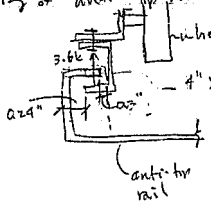


$M_{max} = 0.72\ k \times 17.5/4" = 3.2\ k\text{-}"$ for simp. support

$M_a = 21 \times \frac{1}{3} \times 0.216 = 6.05\ k\text{-}"$ ok

$f_b = \frac{3.2}{0.216} = 14.8\ ksi$ ok

Capacity of anti tip rail



Check bracket

$M = 0.72 \times 0.3 = 0.22\ k\text{-}"$

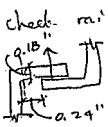
10 ga. $t = 0.135"$

$S = (1)(0.135)^2/6 = 0.0122\ in^3$

$f_b = \frac{0.22}{0.0122} = 17.7\ ksi$

$F_b = 21 \times 1/3 = 28.3\ ksi$ ok

Check rail

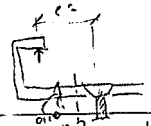


$M = 0.72 \times 0.24 = 0.17\ k\text{-}"$

say 6" eff width

$S = (6)(0.18)^2/6 = 0.0324\ in^3$

$f_b = \frac{0.17}{0.0324} = 5.3\ ksi$ ok



$e = 1.177 - 0.18 - 0.24 = 0.76$

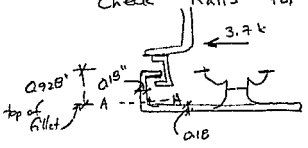
$M = 0.72 \times 0.76 = 0.55\ k\text{-}"$

$S = 0.0329$ $f_b = 16.9\ ksi$

Max moment here

kpff Consulting Engineers Portland, Oregon	Project Black H. - Tal	By kas	Sheet No. R4
	Location	Date 10/2/00	
	Client	Revised	Job No.
		Date	

Check Rails for shear force ⊥ to rail



anti-tip channels at adjacent rails face opposite directions!

100% of seismic load transferred to one rail. 2 clips per cabinet row

$V = 3.7\ k / 2 = 1.85\ k$

check bending about line A-A

$M = 1.85\ k \times (0.928") = 1.72\ k\text{-}"$

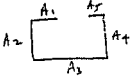
say $b_{eff} = 12"$

$S = (12)(0.18)^2/6 = 0.065\ in^3$

$f_b = \frac{1.72}{0.065} = 26.4\ ksi$ ok!!

check rail bending between anchors

find section properties - ref. sketch p. T2



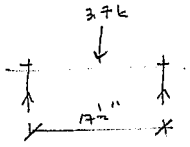
	A_i	$\bar{x}_i$	$A\bar{x}_i$
A_1	$0.724 \times 0.18 = 0.1303$	0.362	0.04718
A_2	$1.053 \times 0.18 = 0.1895$	0.09	0.01706
A_3	$2.02 \times 0.18 = 0.3636$	1.19	0.4327
A_4	$1.053 \times 0.15 = 0.1580$	2.275	0.3593
A_5	$0.25 \times 0.18 = 0.045$	2.225	0.1001
	0.8864		0.9564

$\bar{x} = \frac{0.9564}{0.8864} = 1.08"$

check rails weak bending cont'd

$$I_y = \frac{0.724^3(0.18)}{12} + 0.1303(1.08 - 0.362)^2$$
$$+ 0.1895(1.08 - 0.09)^2$$
$$+ \frac{(2.02)^3(0.18)}{12} + (1.19 - 1.08)^2(0.3636)$$
$$+ 0.1580(2.275 - 1.08)^2$$
$$+ \frac{0.18(0.25)^3}{12} + 0.045(2.225 - 1.08)^2$$
$$= 0.671 \text{ in}^4$$

$$S_{y\,min.} = \frac{0.671}{1.08} = 0.622 \text{ in}^3$$



$M = 3.7(17\frac{1}{2})/4 = 16.2$ k"

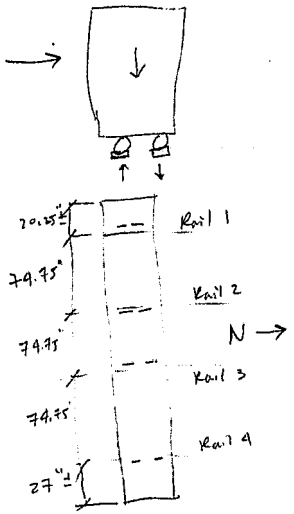
$f_b = \frac{16.2}{0.622} = 26.0$ ksi ok

kpff Consulting Engineers Portland, Oregon	Project Black H. - Tal	By tas	Sheet No. R6
	Location	Date 10/3/00	
	Client	Revised	Job No.
		Date	

check anchors

EQ parallel to rails — provide (4) anti-tip rails per Mark Hessler / Tal engr.
shear is transferred through binding of anti-tip bracket w/ anti-tip rail

Usual attachment is 3/8" ϕ anchor @ 17½" o.c.



distr shr & uplift to rails by trib area

Rail 1 $T = 20.25 + \frac{74.75}{2} = 57.6"$

2 $T = 74.75" = 6.23'$ control

3 $T = 74.75"$

4 $T = \frac{74.75}{2} + 27 = 64.4"$

$\Sigma L = 271.5" = 22.625'$

% to rails 2 & 3 $= \frac{6.23}{22.6} = 27.6\%$

For one cabinet row

$\Sigma V = 3693\ \#$ (p. R1)

V rail 2 $= 0.276(3693) = 1018\ \#$

width of cabinet $= 30" = 2.5'$

$w = \frac{1018}{2.5} = 407$ plf

V per anchor $= 407\text{ plf}\left(\frac{17\frac{1}{2}"}{12"}\right) = 594\ \#$

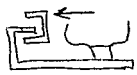
Uplift Tnet $= 1440\ \#$ (p. R1)

T rail 2 $= 0.276 \times 1440 = 397\ \#$

kpff Consulting Engineers Portland, Oregon	Project Black Hi - Tab	By kas	Sheet No.
	Location	Date 10/3/00	R7
	Client	Revised	Job No.
		Date	

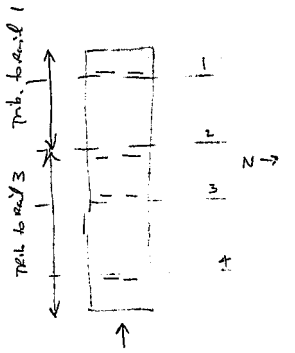
check anchors cont'd

EO perpendicular to rails



shear -
transfer is by contact btwn anti-tip bracket & rail in one-direction only

alternate rails are effective



Trib. to Rail 1 $20.25 + 74.75 = 95"$

Trib. to Rail 3 $2 \times 74.75 + 27 = 176.5" = 14.7'$ ← controls

% Rail 3 $= \frac{14.7}{22.6} = 0.65$

$V_{rail\ 3} = 0.65 \times 3693 = 2400\ \#$

$w = \frac{2400}{2.5} = 960\ plf$

$V_{per\ anchor} = 960\left(\frac{17.5'}{12}\right) = 1400\ \#$

Uplift $M_{OT} = 3.7(47.6) = 176\ k\text{-}"$

$M_{RES} = 13.1\ k\left(\frac{74.75" \times 3}{2}\right) = 979\ k\text{-}"$

no uplift ok!!

kpff Consulting Engineers Portland, Oregon	Project Black H-Tab	By Ras	Sheet No.
	Location	Date 10/2/00	RB
	Client	Revised	Job No.
		Date	

To get adequate embedment after spacing of holes in rail @ 12" o.c. all anchors are centered on low flute

$h = 5\frac{1}{2}"$

Use $\frac{3}{8}"\phi$ powr-bolt @ 12" o.c.
(embed 3" → not shallow anchor

$T_a = 1215\#$
$V_a = 1790\#$
} REF. ICBO ER-5225 (attached)

EQ // to rails

$$\frac{397}{1215 \times \frac{4}{3}} + \frac{599}{1790 \times \frac{4}{3}} = 0.49 \quad ok //$$

EQ ⊥ to rails

$$\frac{0}{1215 \times \frac{4}{3}} + \frac{1400}{1790 \times \frac{4}{3}} = 0.59 \quad ok //$$

Anti-tip rails are provided at all (4) rails
$\frac{3}{8}"\phi$ Powr-Bolt, embed 3", @ 12" o.c. over low flute

ICBO Evaluation Service, Inc.
5360 WORKMAN MILL ROAD • WHITTIER, CALIFORNIA 90601-2299
A subsidiary corporation of the International Conference of Building Officials

EVALUATION REPORT

ER-5225
Reissued October 1, 1999

Filing Category: FASTENERS—Concrete and Masonry Anchors (066)

POWERS CONCRETE ANCHORS
POWERS RAWL, POWERS FASTENING, INC.
TWO POWERS SQUARE
NEW ROCHELLE, NEW YORK 10802

1.0 SUBJECT

Powers Fasteners Power-Bolt (Rawl-Bolt), Power-Stud (Rawl-Stud), Steel Drop-In, and Hollow Set Drop-In Concrete Anchors.

2.0 DESCRIPTION

2.1 Power-Bolt (Rawl-Bolt) Anchor:

2.1.1 General: The Power-Bolt anchor is a heavy duty sleeve-type anchor available with either a finished hex head or a flat head for use in stone aggregate concrete. The carbon steel hex head or flat head styles are assembled using a Grade 5 bolt complying with ASTM A 449, a hardened washer complying with ANSI B18.22.1-1965 (no washer on flat head style), a nylon compression ring, a precision-stamped expansion sleeve manufactured from AISI 1010-1020 steel (an extender sleeve is included on the longer lengths), and a partially slotted cone manufactured from AISI 12L14 steel. The carbon steel version of the anchor is zinc-plated with a supplemental chromate finish in accordance with ASTM B 633.

The Type 304 stainless steel hex head style is assembled using a Type 18-8 (300 series) hex head bolt complying with ASTM F 593, Alloy Group 1; a Type 18-8 washer; a nylon compression ring; a precision-stamped expansion sleeve manufactured from Type 304 stainless steel (an extender sleeve is also included on the longer lengths); and a partially slotted cone manufactured from Type 303 stainless steel.

As the anchor is driven into a predrilled hole, the slotted, oversized, annular anti-vibration ring at the bottom of the cone reduces in size until it mates with the hole to prevent the anchor from spinning in the hole while it is tightened. As the anchor is tightened, the nylon compression ring will, if necessary, compress to ensure that the material being fastened is tightly secured against the face of the concrete. Expansion occurs at two levels within the drilled hole. The cone is pulled into the large triple-tined expansion sleeve, developing a mid-level load-bearing capacity over a large surface area. Further turning of the bolt causes the threaded portion of the bolt to advance into the threads at the compressed end of the cone. Allowable tension and shear values are noted in Table 1.

2.1.2 Installation: Embedment, spacing, edge distance, and concrete requirements are shown in Tables 1 and 2. Anchor holes must be pre-drilled in normal-weight concrete using a bit complying with ANSI B212.15-1994. The anchors must be installed in holes having the same diameter as the nominal anchor diameter, drilled to a depth allowing the required embedment. Dust and debris must be removed from the holes by means of a blow-out bulb. The Power-Bolt must be inserted through the material being fastened; the bolt must be tapped into the hole until it is flush with the work surface at the desired embedment depth, which under no circumstances is permitted to be less than the minimum embedment. The bolt in the anchor assembly must be tightened until the minimum installation torque listed in Table 1 is achieved.

2.2 Power-Stud (Rawl-Stud) Anchor:

2.2.1 General: The Power-Stud anchor is a one-piece steel expansion anchor with dual interlocking steel-expansion wedges designed for use in stone aggregate. It is available in threaded, tie-wire, rod hanger, and rod coupling styles. Zinc-plated carbon steel, mechanically galvanized carbon steel, and stainless steel versions are available.

The carbon steel anchor bodies are cold-formed from AISI 1018 carbon steel for the $^1/_4$-inch (6.4 mm) through $^3/_4$-inch (19.1 mm) diameters with lengths of 7 inches (178 mm) or less. For the $^5/_8$-inch (15.9 mm) or $^3/_4$-inch (19.1 mm) diameters with lengths longer than 7 inches (178 mm), and for the $^7/_8$-inch (22 mm) and larger diameters, the anchor body is machined from AISI 12L14 steel. The interlocking wedges are formed from AISI 1010 carbon steel. The nuts are commercial grade steel complying with ASTM A 563, Grade A, and the washers are AISI 1010 carbon steel. The anchor is plated with commercial zinc with a supplemental chromate finish in accordance with ASTM B 633. The mechanically galvanized version is plated in accordance with ASTM B 695.

For the Type 304 stainless steel version, the anchor body for the $^1/_4$-inch (6.4 mm) through $^3/_4$-inch (19.1 mm) diameters [with lengths of 7 inches (178 mm) or less] is manufactured from AISI Type 304, Cu (302 HQ) stainless steel. The anchor bodies for the $^5/_8$-inch (15.9 mm) or $^3/_4$-inch (19.1 mm) diameters with lengths greater than 7 inches (178 mm), and the $^7/_8$-inch (22 mm) or larger diameters, are machined from ASTM F 593 Type 303/304 stainless steel. The interlocking clips are Type 304 stainless steel. The nuts and washers are commercial grade, manufactured from Type 18-8 (300 Series) stainless steel. On the Type 316 stainless steel version, the anchor body is manufactured from AISI Type 316 stainless steel meeting the requirements of ASTM A 193. The interlocking clips are Type 304 or Type 316 stainless steel. The nuts and washers are commercial grade, manufactured from AISI Type 316 stainless steel.

The anchor body is threaded or stamped with a spade head on the upper end, and has a tapered expansion section on the working end, on which a set of interlocking wedges is mounted. Each wedge is fastened to the reduced diameter of the stud by interlocking tabs. As the anchor is tightened, the

wedge mechanism compresses against the wall of the anchor hole. Allowable tension and shear loads are noted in Table 3.

2.2.2 Installation: Embedment, spacing, edge distance, and concrete requirements are shown in Tables 3 and 4. Anchor holes must be pre-drilled in normal-weight concrete using a bit complying with ANSI B212.15-1994. The anchors must be installed in holes having the same diameter as the nominal anchor diameter, drilled to a depth allowing the required embedment. Dust and debris must be removed from the holes by means of a blow-out bulb. The anchor must be tapped into the hole until it is at the desired embedment depth, which under no circumstances is permitted to be less than the minimum embedment. The anchor is set by tightening the nut against the washer until the minimum installation torque listed in Table 3 is achieved.

2.3 Steel Drop-in Anchor:

2.3.1 General: The Steel Drop-in anchor is an internally threaded expansion anchor complete with an internal expander plug designed for use in stone aggregate concrete. The steel Drop-in anchor is supplied in carbon steel, coil thread, Type 304 stainless steel, and Type 316 stainless steel versions.

In the carbon steel and coil thread versions, the anchor body is manufactured from AISI 12L14 carbon steel, and the expansion cone is formed from AISI 1018 carbon steel. The anchors are plated with commercial zinc with a supplemental chromate finish in accordance with ASTM B 633.

For the Type 304 stainless steel version, the anchor body is manufactured from ASTM F 593 Type 303 stainless steel, and the expansion cone is formed from ASTM F 593 Type 304 stainless steel. On the Type 316 version, the anchor body and the expansion cone are manufactured from ASTM F 593 Type 316 stainless steel.

As the anchor is expanded with a setting tool, the pre-assembled internal expander plug flares the anchor shell radially, compressing against the wall of the anchor hole. Allowable tension and shear loads are noted in Table 5.

2.3.2 Installation: Embedment, spacing, edge distance, and concrete requirements are shown in Tables 5 and 6. Anchor holes must be pre-drilled in normal-weight concrete using a bit complying with ANSI B212.15-1994. The anchors must be installed in holes having the diameters and depths listed in Table 5. Dust and debris must be removed from the holes by means of a blow-out bulb. The anchor is inserted into the hole until it is flush with the work surface at the desired embedment depth, which under no circumstances is permitted to be less than the minimum embedment. A matching setting tool is used to properly expand the anchor.

2.4 Hollow Set Drop-in Anchor:

2.4.1 General: The Hollow Set Drop-in anchor is designed with a slotted, tapered expansion sleeve and an internally threaded expansion cone for shallow embedment applications in stone aggregate concrete materials, including precast plank.

The expansion sleeve is formed from Zamac alloy, and the expansion cone is formed from either AISI 12L14 carbon steel, which is zinc-plated in accordance with ASTM B 633, or Type 304 stainless steel.

Depending on the setting method used, as the anchor is set or tightened, the expansion sleeve is driven over the cone or the cone is pulled into the sleeve, causing it to compress against the wall of the anchor hole. Allowable tension and shear loads are noted in Table 7.

2.4.2 Installation: Embedment, spacing, edge distance, and concrete requirements are shown in Tables 7 and 8. Anchor holes must be pre-drilled in normal-weight concrete using a bit complying with ANSI B212.15-1994. The anchors must be installed in holes having the diameters and depths listed in Table 7. Dust and debris must be removed from the hole by means of a blow-out bulb. The anchor is inserted into the hole until it is flush with the work surface at the desired embedment depth, which under no circumstances is permitted to be less than the minimum embedment. A matching hollow or solid setting tool is supplied to properly expand the anchor.

2.5 Design:

Allowable static loads for anchors installed in accordance with this report are listed in Tables 1, 3, 5 and 7. Allowable loads for anchors subjected to combined shear and tension forces are determined using the following equation:

$$(P_s/P_t) + (V_s/V_t) \quad 1$$

where:

P_s = Applied service tension load.
P_t = Allowable service tension load.
V_s = Applied service shear load.
V_t = Allowable service shear load.

Use of these anchors in resisting vibratory or shock loads, such as those encountered by supports for reciprocating engines or crane loads, is beyond the scope of this report.

2.6 Special Inspection:

When design loads require special inspection during anchor installation, compliance with Section 1701.5 of the code is necessary. The inspector's duties include verification of anchor type and dimensions; concrete type and compressive strength; predrilled hole dimensions and cleanliness; drill bit compliance with ANSI B212.15-1994; anchor spacings, edge distances and embedment; and anchor installation in accordance with the manufacturer's published installation instructions and this report.

2.7 Identification:

The anchors are identified in the field by dimensional characteristics and packaging. The packaging label bears the manufacturer's name and address, the size and type of anchor, and the evaluation report number (ICBO ES ER-5225). A logo and length identification code letter are stamped on the threaded end of the bolt. See the length identification system in Table 9.

3.0 EVIDENCE SUBMITTED

Data complying with the ICBO ES Acceptance Criteria for Expansion Anchors in Concrete and Masonry Elements (AC01), dated January 1999.

4.0 FINDINGS

That the Powers concrete anchors described in this report comply with the 1997 *Uniform Building Code*™, subject to the following conditions:

4.1 Anchor sizes, dimensions, and installation are as set forth in this report.

4.2 Allowable tension and shear values comply with this report.

4.3 Calculations justifying that the applied loads comply with this report are submitted to the building official for approval.

4.4 Special inspection is provided as set forth in Section 2.6 of this report.

4.5 Anchors are limited to installation in uncracked concrete, which is defined as concrete subjected to tensile stresses not exceeding 170 psi (1.2 MPa) as induced by external loads and deformations.

4.6 The allowable loads may be increased by 33$^1/_3$ percent for short-term loading due to seismic or wind forces.

4.7 Anchors are limited to nonfire-resistive construction unless appropriate data is submitted to demonstrate that anchor performance is maintained in fire-resistive situations.

4.8 Use of electroplated or mechanically plated carbon steel anchors is limited to dry, interior locations. Use of hot-dipped galvanized carbon steel or stainless steel anchors is permitted in exterior-exposure or damp environments.

4.9 Anchors are manufactured by Powers Fasteners, Inc., Two Powers Square, New Rochelle, N.Y., with quality control inspections by CEL Consulting (AA-639).

4.10 Anchors are not permitted to be subjected to vibratory or shock loads, such as those encountered by supports for reciprocating engines, crane loads and moving loads due to vehicles.

This report is subject to re-examination in one year.

TABLE 1—POWER-BOLT (RAWL-BOLT) ALLOWABLE SHEAR AND TENSION VALUES[1,2,4,5] (pounds)

ANCHOR DIAMETER (inch)	EMBEDMENT DEPTH (inches)	INSTALLATION TORQUE GUIDE VALUES (ft.-lbs.)		f'_c= 2,000 psi			f'_c= 4,000 psi			f'_c= 6,000 psi		
				Tension			Tension			Tension		
		Carbon	Stainless	With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear
1/4	1 1/4	4	4	250	125	515	250	125	530	250	125	530
	1 3/4	4	4	270	135	515	265	135	635	300	150	635
	2 1/2	4	4	270	135	515	280	140	845	380	190	845
3/8	2	35	20	780	390	995	1,145	575	1,605	1,480	740	1,605
	2 1/2	35	20	840	420	995	1,215	605	1,790	1,665	835	1,790
	3 1/2	35	20	1,100	550	995	1,500	750	2,165	1,790	895	2,165
1/2	2 1/2	60	35	1,075	540	1,710	1,465	730	2,055	1,830	915	2,055
	3 1/2	60	35	1,205	605	1,710	2,050	1,025	2,465	2,470	1,235	2,465
	5	60	35	1,255	625	1,710	2,220	1,110	3,080	2,735	1,365	3,080
5/8	2 3/4	100	60	820	410	1,995	1,925	965	2 995	2,125	1,060	2,995
	4	100	60	1,295	640	1,995	2,190	1,095	3,640	3,275	1,640	3,640
	6	100	60	1,295	640	1,995	2,735	1,365	4,670	3,390	1,695	4,670
3/4	3	120	90	1,415	710	3,095	2,045	1,020	4,025	2,693	1,350	4,025
	4 1/2	120	90	1,450	725	3,095	2,715	1,360	4,955	3,465	1,735	4,955
	7	120	90	1,495	745	3,095	3,300	1,650	6,510	4,850	2,425	6,510

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N, 1 foot-pound = 1.36 N-m.

The tabulated shear and tension values are for anchors installed in normal-weight concrete that has reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

[2]The tabulated values are for anchors installed with spacing and edge distance in accordance with Table 2.

[3]These tension values are applicable only when the anchors are installed with special inspection as set forth in Section 2.6.

[4]The allowable loads may be increased by 33 1/3 percent for short-term loading due to seismic or wind forces.

[5]Concrete slab thickness must be at least $1\frac{1}{2}\,h_v$. Compliance with Section 1907.7 of the code must be provided.

TABLE 2—POWER-BOLT (RAWL-BOLT) ANCHOR ALLOWABLE SPACING AND EDGE DISTANCE [1,2,3]

	DISTANCE FOR FULL ANCHOR CAPACITY (critical distance)[1]	DISTANCE FOR REDUCED ANCHOR CAPACITY (minimum distance)[2]	REDUCTION FACTOR[3]
SPACING BETWEEN ANCHORS (s)	$4.0h_v$	$2.0\,E$	0.5
EDGE DISTANCE—TENSION LOADS (M)	$12\,D$	$5D$	0.7
EDGE DISTANCE—SHEAR LOADS (M)	$12\,D$	$5D$	0.35

[1]The listed values are the minimum distances required to obtain the load values listed in Table 1. h_v = embedment depth; D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest and deepest values for D and E.

[2]The listed values are the minimum distances at which the anchors can be set when load values are adjusted appropriately.

[3]Load values in Table 1 are multiplied by the appropriate reduction factor when anchors are installed at the minimum spacing or edge distance listed. Use linear interpolation for spacing and edge distance between critical and minimum distances. Multiple reduction factors (such as two edges, or spacing and edge, etc.) are calculated separately and multiplied.

TABLE 3—POWER-STUD (RAWL-STUD) ALLOWABLE SHEAR AND TENSION VALUES[1,2,4,5] (pounds)

ANCHOR DIAMETER (inches)	EMBEDMENT DEPTH (inches)	INSTALLATION TORQUE GUIDE VALUES (ft.-lbs.)	f'_c= 2,000 psi			f'_c= 4,000 psi			f'_c= 6,000 psi		
			Tension			Tension			Tension		
			With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear
1/4	1 1/8	8	310	155	395	360	180	405	435	215	405
	2	8	475	235	395	520	260	405	525	260	405
3/8	1 5/8	28	480	240	890	760	380	940	760	380	940
	3	28	1,025	510	995	1,505	755	940	1,505	755	940
1/2	2 1/4	60	860	430	1,635	1,390	695	1,700	1,635	820	1,700
	4	60	1,425	710	1,635	2,040	1,020	1,700	2,300	1,150	1,700
5/8	2 3/4	90	1,560	785	2,320	2,075	1,040	2,975	2,465	1,235	2,975
	5	90	2,650	1,330	2,320	3,125	1,565	2,975	4,160	2,050	2,975
3/4	3 3/8	175	1,855	930	3,095	2,185	1,095	3,765	3,135	1,565	3,765
	6	175	1,860	930	3,095	3,115	1,560	3,765	5,045	2,520	3,765
7/8	3 7/8	250	1,475	740	4,490	3,075	1,540	6,040	4,325	2,160	6,040
	7	250	1,805	900	4,490	5,110	2,555	6,040	7,795	3,900	6,040
1	4 1/2	300	2,185	1,095	6,605	3,455	1,730	7,775	9,230	4,615	7,775
	8	300	5,590	2,795	6,605	6,760	3,380	7,775	11,055	5,525	7,775
1 1/4	5 1/2	450	3,820	1,910	10,205	6,745	3,370	10,205	9,230	4,615	10,205
	10	450	6,510	3,255	10,205	13,070	6,535	10,205	15,170	7,585	10,205

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N, 1 foot-pound = 1.36 N-m.

[1]The tabulated shear and tension values are for anchors installed in normal-weight concrete that has reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

[2]The tabulated values are for anchors installed with spacing and edge distance in accordance with Table 4.

[3]These tension values are applicable only when the anchors are installed with special inspection as set forth in Section 2.6.

[4]The allowable loads may be increased by 33 1/3 percent for short-term loading due to seismic or wind forces.

[5]Concrete slab thickness must be at least $1\frac{1}{2}\ h_y$. Compliance with Section 1907.7 of the code must be provided.

TABLE 4—POWER-STUD (RAWL-STUD) ANCHOR ALLOWABLE SPACING AND EDGE DISTANCE [1,2,3]

	DISTANCE FOR FULL ANCHOR CAPACITY (critical distance)[1]	DISTANCE FOR REDUCED ANCHOR CAPACITY (minimum distance)[2]	REDUCTION FACTOR[3]
SPACING BETWEEN ANCHORS (s)	$4.0h_y$	$2.0\ E$	0.5
EDGE DISTANCE—TENSION LOADS (M)	$12\ D$	$5D$	0.75
EDGE DISTANCE—SHEAR LOADS (M)	$12\ D$	$5D$	0.35

[1]The listed values are the minimum distances required to obtain the load values listed in Table 3. h_y = embedment depth; D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest and deepest values for D and E.

[2]The listed values are the minimum distances at which the anchors can be set when load values are adjusted appropriately.

[3]Load values in Table 3 are multiplied by the appropriate reduction factor when anchors are installed at the minimum spacing or edge distance listed. Use linear interpolation for spacing and edge distance between critical and minimum distances. Multiple reduction factors (such as two edges, or spacing and edge, etc.) are calculated separately and multiplied.

TABLE 5—STEEL DROP-IN ANCHOR ALLOWABLE SHEAR AND TENSION VALUES[1,2,4,5] (pounds)

ANCHOR DIAMETER (inch)	HOLE DIAMETER (inch)	EMBEDMENT DEPTH, h_y (inches)	f'_c= 2,000 psi			f'_c= 4,000 psi			f'_c= 6,000 psi		
			Tension			Tension			Tension		
			With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear
1/4	3/8	1	285	140	530	495	250	530	520	260	530
3/8	1/2	1 1/2	545	270	1,145	1,045	520	1,145	1,235	620	1,145
1/2	5/8	2	1,025	515	1,600	1,440	720	1,600	1,645	825	1,600
5/8	7/8	2 1/2	1,165	585	3,095	1,860	930	3,095	2,730	1,365	3,095
3/4	1	3	2,145	1,070	3,920	3,600	1,800	3,920	4,325	2,160	3,920

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

[1]The tabulated shear and tension values are for anchors installed in normal-weight concrete that has reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

[2]The tabulated values are for anchors installed with spacing and edge distance in accordance with Table 6.

[3]These tension values are applicable only when the anchors are installed with special inspection as set forth in Section 2.6.

[4]The allowable loads may be increased by 33 1/3 percent for short-term loading due to seismic or wind forces.

[5]Concrete slab thickness must be at least $1\frac{1}{2}\ h_y$. Compliance with Section 1907.7 of the code must be provided.

TABLE 6—STEEL DROP-IN ANCHOR ALLOWABLE SPACING AND EDGE DISTANCE [1,2,3]

	DISTANCE FOR FULL ANCHOR CAPACITY (critical distance)[1]	DISTANCE FOR REDUCED ANCHOR CAPACITY (minimum distance)[2]	REDUCTION FACTOR[3]
SPACING BETWEEN ANCHORS (s)	$4.0h_v$	$2.0E$	0.5
EDGE DISTANCE—TENSION LOADS (M)	$14D$	$7D$	0.9
EDGE DISTANCE—SHEAR LOADS (M)	$14D$	$7D$	0.5

[1]The listed values are the minimum distances required to obtain the load values listed in Table 5. h_v = embedment depth; D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest and deepest values for D and E.

[2]The listed values are the minimum distances at which the anchors can be set when load values are adjusted appropriately.

[3]Load values in Table 5 are multiplied by the appropriate reduction factor when anchors are installed at the minimum spacing or edge distance listed. Use linear interpolation for spacing and edge distance between critical and minimum distances. Multiple reduction factors (such as two edges, or spacing and edge, etc.) are calculated separately and multiplied.

TABLE 7—HOLLOW SET DROP-IN ANCHOR ALLOWABLE SHEAR AND TENSION VALUES[1,2,4,5] (pounds)

ANCHOR DIAMETER (inch)	HOLE DIAMETER (inch)	EMBEDMENT DEPTH (inches)	f'_c= 2,000 psi			f'_c= 4,000 psi			f'_c= 6,000 psi		
			Tension			Tension			Tension		
			With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear	With Sp. Insp.[3]	Without Sp. Insp.	Shear
1/4	3/8	7/8	190	95	360	245	120	360	455	225	360
5/16	3/8	1 1/2	425	215	685	535	265	685	1,135	570	685
3/8	5/8	1 1/2	470	235	785	675	340	785	1,270	635	785
1/2	3/4	2	535	270	1,005	845	420	1,005	2,300	1,150	1,005
5/8	1	2 1/4	1,425	710	1,600	2,290	1,145	1,600	3,020	1,510	1,600

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

[1]The tabulated shear and tension values are for anchors installed in normal-weight concrete that has reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

[2]The tabulated values are for anchors installed with spacing and edge distance in accordance with Table 8.

[3]These tension values are applicable only when the anchors are installed with special inspection as set forth in Section 2.6.

[4]The allowable loads may be increased by 33 1/3 percent for short-term loading due to seismic or wind forces.

[5]Concrete slab thickness must be at least $1\frac{1}{2}\,h_v$. Compliance with Section 1907.7 of the code must be provided.

TABLE 8—HOLLOW SET DROP-IN ANCHOR ALLOWABLE SPACING AND EDGE DISTANCE [1,2,3]

	DISTANCE FOR FULL ANCHOR CAPACITY (CRITICAL DISTANCE)[1]	DISTANCE FOR REDUCED ANCHOR CAPACITY (MINIMUM DISTANCE)[2]	REDUCTION FACTOR[3]
SPACING BETWEEN ANCHORS (s)	$4.0h_v$	$2.0E$	0.5
EDGE DISTANCE—TENSION LOADS (M)	$14D$	$8D$	0.8
EDGE DISTANCE—SHEAR LOADS (M)	$14D$	$8D$	0.5

[1]The listed values are the minimum distances required to obtain the load values listed in Table 7. h_v = embedment depth; D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest and deepest values for D and E.

[2]The listed values are the minimum distances at which the anchors can be set when load values are adjusted appropriately.

[3]Load values in Table 7 are multiplied by the appropriate reduction factor when anchors are installed at the minimum spacing or edge distance listed. Use linear interpolation for spacing and edge distance between critical and minimum distances. Multiple reduction factors (such as two edges, or spacing and edge, etc.) are calculated separately and multiplied.

TABLE 9—LENGTH IDENTIFCATION SYSTEM

CODE ON ANCHOR		A	B	C	D	E	F	G	H	I	J	K	L	M
LENGTH OF ANCHOR (inches)	From	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2
	Up to but not including	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8

CODE ON ANCHOR		N	O	P	Q	R	S	T	U	V	W	X	Y	Z
LENGTH OF ANCHOR (inches)	From	8	8 1/2	9	9 1/2	10	11	12	13	14	15	16	17	18
	Up to but not including	8 1/2	9	9 1/2	10	11	12	13	14	15	16	17	18	19

For SI: 1 inch = 25.4 mm.

LETTER OF TRANSMITTAL

August 7, 2000

To: **Mark Booth**
Zimmer Gunsul Frasca Partnership
320 S.W. Oak, Suite 500
Portland, OR 97204-2737
(503) 417-4318 Fax: (503) 224-2482

From: Kurt Hiland

rfc:
cc:

Project: Black Helterline
Project #: 200Z3006.A
Subject: Electrical Plan Review Comments

RECEIVED
AUG 08 2000
ZIMMER GUNSUL FRASCA

Enclosed	Via	For Your
☐ ORIGINALS	☑ MESSENGER	☐ USE
☐ PRINTS	☐ OVERNIGHT MAIL	☐ APPROVAL
☐ SPECIFICATIONS	☐ MAIL	☐ REVIEW/COMMENT
☐ SHOP DRAWINGS	☐ HAND	☑ DISTRIBUTION
☑ LETTER/MEMO	☐ _____	☐ _____
☐ SUBMITTALS		
☐ _____		

Enclosures

No. of Copies	Date	Description
1		Memo to Lee Hartfield
1		Panel schedule ELS-18
1		Panel schedule ELI.S-18
1		MSWB-TWR schedule
1		Drawing RE-01

Remarks

Signature: Kurt Hiland

Document

FW: E05 Black Helterline

MEMORANDUM

August 4, 2000

To: **Mr. Lee Hartfield**
1900 SW 4th Avenue, Suite 5000
Portland, OR 97201
Fax: 503-823-6983

From: Kurt Hiland

rfc:

cc: William Parry, Steffen Brocks

Project: Fox Tower Black Helterline T.I.

Project #: 200Z3006.A

Subject: Electrical Plan Review Corrections

☐ Record of Telephone Conversation on

☐ Mail Original

Here is our response to the correction items of July 31, 2000 for the Black Helterline T.I. Plans:

Item 1: The values for available fault current have been taken from the core & shell design. Fault current is 5,886A at panel L-18 and 65,561A at panel H-18.

Item 2: The numbers in the column "CONNECTED LOAD SUMMARY PH. AMPS" on the panel schedules are amps per phase *before* applying NEC demand factors. This information is used mainly for phase balancing.

Panel L18 sub-feeds two 100A panels and has a 225A bus. While the connected amps on panel L18 exceed 225A, the load types for L18 and its two sub-fed panels are almost entirely receptacle loads. The diversity taken on these receptacle loads per NEC 220-13 brings down the demand amps to 147A.

Item 3: Please refer to the attached schedule from the core & shell design for switchboard MSWB-TWR (provided by Dynalectric). Vertical bus VB-2 serves normal power from this switchboard to tenant levels 17 thru 27. According to this schedule, there is an existing demand of 1,232 kVA on VB-2 (core loads only). The new load on bus VB-2 for tenant level 19 is found on the attached schedule for panel H18.

Item 4: Please see attached RE-01 and panel schedules ELS-17 & ELLS-17.

PROJ/PHASE: ENTER PROJECT NAME AND PHASE OF CONSTRUCTION

EXISTING

LOCATION: ELECTRICAL ROOM

PNL- H18

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	(E) LIGHTING CORE		L		3.1	20	1	A	60	3	N		12.0	60.4	FPB'S 1,6,13,17 (EXIST BKR)	2
3	RELAY 1 (LC1) ZONE 1	20.1	L		3.6	20	1	B		---	N		12.0		---	4
5	RELAY 2 (LC1) ZONE 2	20.1	L		2.3	20	1	C		---	N		12.0		---	6
7	RELAY 3 (LC1) ZONE 3	20.1	L		3.1	20	1	A	60	3	N		10.7	60.4	FPB'S 5,10,16,20,21 (EXIST BK	8
9	RELAY 4 (LC1) ZONE 4	20.1	L		1.5	20	1	B		---	N		10.7		---	10
11	RELAY 5 (LC1) ZONE 5	20.1	L		3.2	20	1	C		---	N		10.7		---	12
13	RELAY 6 (LC1) ZONE 6	20.1	L		2.6	20	1	A	60	3	N		10.7	60.4	FPB'S 3,4,8,9,15 (EXIST BKR)	14
15	RELAY 7 (LC1) ZONE 7	20.1	L		2.5	20	1	B		---	N		10.7		---	16
17	SPARE					20	1	C		---	N		10.7		---	18
19	SPARE					20	1	A	30	3	N		4.7	30.4	FPB'S 7,18,19	20
21	SPARE					20	1	B		---	N		4.7		---	22
23	SPARE					20	1	C		---	N		4.7		---	24
25	EWH-2 (CONF. 1902)	50.1	N		9.0	50	1	A	30	3	N		6.3	30.4	FPB'S 2,11,12,14	26
27	EWH-2 (COPY/COFFEE 1905)	50.1	N		9.0	50	1	B		---	N		6.3		---	28
29	FUTURE INSTAHOT		N		9.0	50	1	C		---	N		6.3		---	30
31	EWH-1 (LOUNGE 1925)	20.3	N		1.0	15	3	A							SPACE	32
33	---		N		1.0		---	B							SPACE	34
35	---		N		1.0		---	C							SPACE	36
37	CRAC-T19.1	20.3	N		2.4	15	3	A	125	3	S		32.0	110.3	SUBFEED PNL L18 (EXIST BK	38
39	---		N		2.4		---	B		---	S		24.3		--- VIA 75 KVA XFR	40
41	---		N		2.4		---	C		---	S		26.7		---	42

VOLTAGE: **480Y/277V, 3P, 4W**

I.E.R.: **100,000A RMS SYM.**

MOUNTING: **SURFACE**

MAINS: **400A MAIN CIRCUIT BRKR.**

BUS SIZE: **400A**

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	22.0	125% OF LOAD	27	33
(R) RECEPT. ——>	79.8	NEC 220-13	45	54
(M) MOTOR ——>	1.9	NEC 430-24-(0 ")	2	3
(C) CONTINUOUS-->		125% OF [illegible]		
(N) NON-CONT.---->	171.3	100% OF LOAD	171	206
(K) KITCHEN ——>		NEC 220-20 0%		
	275.1		246	296
WITH 20% SPARE	330.1		295	355

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY PH	AMPS
A	352
B	320
C	321
80% RATED PNL. DEMAND FACTORS	

ADDITIONAL PANEL FEATURES:
DOOR-IN-DOOR FRONT

BREAKER NOTES:

NOT FOR CONSTRUCTION

DATE ISSUED: **10-Jul-2000**

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

PNL- ELLS-17

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	L15 FSD'S	20.1	C		0.8	20	1	A	20	1	C		0.6		L18 FIRE MINIPLEX	2
3	L15 ELEC ROOM		R		0.4	20	1	B	20	1	C		1.2		L20, L18 FIRE NAC PNL	4
5	L15 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.1		L18 THRU L2 I SD LOCK	6
7	L16 FSD'S	20.1	C		0.4	20	1	A	20	1	C		0.6		L16 FIRE NAC PNL	8
9	L16 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L20 HVAC CNTL PNL	10
11	L16 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L19 HVAC CNTL PNL	12
13	L17 FSD'S		C		1.4	20	1	A	20	1	C		0.5		L18 HVAC CNTL PNL	14
15	L17 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L17 HVAC CNTL PNL	16
17	L17 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L16 HVAC CNTL PNL	18
19	L18 FSD'S		C		1.0	20	1	A	20	1	C		0.5		L15 HVAC CNTL PNL	20
21	L18 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.7		L17 HVAC BDU	22
23	L18 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	24
25	L19 FSD'S		C		1.2	20	1	A	20	1					SPARE	26
27	L19 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	28
29	L19 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	30
31	L20 FSD'S		C			20	1	A	20	1					SPARE	32
33	L20 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	34
35	L20 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	36
37	SPACE							A							SPACE	38
39	SPACE							B							SPACE	40
41	SPACE							C							SPACE	42

VOLTAGE: 208Y/120V, 3P, 4W

I.E.R.: 10,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 100A MAIN CIRCUIT BRKR.

BUS SIZE: 100A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ------>		125% OF LOAD		
(R) RECEPT. ------>	4.3	NEC 220-13	4	12
(M) MOTOR ------>		NEC 430-24-(0,0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	38
(N) NON-CONT.---->		100% OF LOAD		
(K) KITCHEN ------>		NEC 220-20 0%		
	15.3		18	50
WITH 25% SPARE	19.1		23	62

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY

PH	AMPS
A	58
B	42
C	27

80% RATED PNL. DEMAND FACTORS

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	LEVEL 17 EMERGENCY LIGHT		L		1.2	20	1	A							SPACE	2
3	LEVEL 16 EMERGENCY LIGHT	20.1	L			20	1	B							SPACE	4
5	LEVEL 15 EMERGENCY LIGHT	20.1	L			20	1	C							SPACE	6
7	ELEV RM LEVEL 15		L			20	1	A							SPACE	8
9	SPARE					20	1	B							SPACE	10
11	SPARE					20	1	C							SPACE	12
13	SPARE					20	1	A							SPACE	14
15	SPARE					20	1	B							SPACE	16
17	SPARE					20	1	C							SPACE	18
19	SPARE					[illegible]	1	A							SPACE	20
21	SPARE					20	1	B							SPACE	22
23	SPARE					20	1	C							SPACE	24
25	SPARE					20	1	A							SPACE	26
27	SPARE					20	1	B							SPACE	28
29	SPARE					20	1	C							SPACE	30
31	SPACE							A							SPACE	32
33	SPACE							B							SPACE	34
35	SPACE							C							SPACE	36
37	SPACE							A		3	S		7.0		(E) SUBFEED PNL ELLS17	38
39	SPACE							B		---	S		5.1		--- VIA XFR	40
41	SPACE							C		---	S		3.2		---	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 65,000A RMS SYM.

MOUNTING: SURFACE

MAINS: MAIN LUGS ONLY FROM 400A UPSTREAM OCP

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	1.2	125% OF LOAD	2	2
(R) RECEPT. ——>	4.3	NEC 220-13	4	5
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	17
(N) NON-CONT.——>		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	16.5		20	24
WITH 25% SPARE	20.6		24	29

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY PH	AMPS
A	30
B	18
C	12
80% RATED PNL. DEMAND FACTORS	

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

Sep 22, ' 17:17:39

MSWB-TWR

SWBD SCHEDULE: MSWB TWR SCH

PANEL: MSWB TWR SCH	OC DEVICE TYPE: Fuse	ENCLOSURE: NEMA 1	MAINS(A): 5000	BUS RATING(A): 5000
LOCATION: B1 ELECTRICAL ROOM	DEVICE FAMILY: Bolt On	MOUNTING: Free Standing	WIRING: 3 PHASE 4 WIRE	BUS WITHSTAND(A):200000
FED FROM: 1000DA COLLECT		VOLTAGE: 480		FAULT CURRENT(A):100789

CUBICLE NO	DESCRIPTION	CONNECTED KVA	DEMAND KVA	DESIGN KVA	DESIGN AMPS	OC DEVICE TRIP SIZE	NOTES
1							
2	H-TOWER	191	185	205	247	1000	
3	VB-2 L16	1264	1232	1241	1493	3000	
4	VB-1 L1	1407	1354	1362	1639	3000	
5							
6							

SCHEDULE TOTALS	KVA	AMPS
TOTAL CONNECTED	2861.3	3441.8
TOTAL DEMAND	2545.6	3061.9
TOTAL DESIGN	2593.0	3107.0

BUS TOTALS	KVA
CONNECTED	2861.3
DEMAND	2545.6
DESIGN	2593.0

DATE: Sep 22, 1999
TIME: 17:17:39

GLUMAC

LETTER OF TRANSMITTAL

August 7, 2000

To: **Mark Booth**
Zimmer Gunsul Frasca Partnership
320 S.W. Oak, Suite 500
Portland, OR 97204-2737
(503) 417-4318 Fax: (503) 224-2482

From: Kurt Hiland

rfc:
cc:

Project: Black Helterline
Project #: 200Z2006.A
Subject: Electrical Plan Review Comments

RECEIVED
AUG 08 2000
ZIMMER GUNSUL FRASCA

Enclosed	Via	For Your
☐ ORIGINALS	☑ MESSENGER	☐ USE
☐ PRINTS	☐ OVERNIGHT MAIL	☐ APPROVAL
☐ SPECIFICATIONS	☐ MAIL	☐ REVIEW/COMMENT
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☑ LETTER/MEMO	☐ _____	☐ _____
☐ SUBMITTALS		
☐ _____		

Enclosures

No. of Copies	Date	Description
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1		Panel schedule ELS-18
1		Panel schedule ELLS-18
1		MSWB-TWR schedula
1		Drawing RE-01

Remarks

Signature: Kurt Hiland

Document1

FPP-805 BLACK HELTERLINE

MEMORANDUM

August 4, 2000

To: **Mr. Lee Hartfield**
1900 SW 4th Avenue, Suite 5000
Portland, OR 97201
Fax: 503-823-6983

From: Kurt Hiland

rfc:

cc: William Parry, Steffen Brocks

Project: Fox Tower Black Helterline T.I.

Project #: 200Z3006.A

Subject: Electrical Plan Review Corrections

☐ Record of Telephone Conversation on

☐ Mail Original

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CONSULTING ENGINEERS / MECHANICAL ELECTRICAL ACOUSTICAL ENERGY TELECOMMUNICATIONS
GLUMAC INTERNATIONAL / 320 SW Washington, Suite 200 / Portland, OR 97204 / TEL 503.227.5280 FAX 503.274.7874

PROJ/PHASE: ENTER PROJECT NAME AND PHASE OF CONSTRUCTION

EXISTING

LOCATION: ELECTRICAL ROOM

PNL- H18

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	(E) LIGHTING CORE		L		3.1	20	1	A	60	3	N		12.0	60.4	FPB'S 1,6,13,17 (EXIST BKR)	2
3	RELAY 1 (LC1) ZONE 1	20.1	L		3.6	20	1	B		---	N		12.0		---	4
5	RELAY 2 (LC1) ZONE 2	20.1	L		2.3	20	1	C		---	N		12.0		---	6
7	RELAY 3 (LC1) ZONE 3	20.1	L		3.1	20	1	A	60	3	N		10.7	60.4	FPB'S 5,10,16,20,21 (EXIST BK	8
9	RELAY 4 (LC1) ZONE 4	20.1	L		1.5	20	1	B		---	N		10.7		---	10
11	RELAY 5 (LC1) ZONE 5	20.1	L		3.2	20	1	C		---	N		10.7		---	12
13	RELAY 6 (LC1) ZONE 6	20.1	L		2.6	20	1	A	60	3	N		10.7	60.4	FPB'S 3,4,8,9,15 (EXIST BKR)	14
15	RELAY 7 (LC1) ZONE 7	20.1	L		2.5	20	1	B		---	N		10.7		---	16
17	SPARE					20	1	C		---	N		10.7		---	18
19	SPARE					20	1	A	30	3	N		4.7	30.4	FPB'S 7,18,19	20
21	SPARE					20	1	B		---	N		4.7		---	22
23	SPARE					20	1	C		---	N		4.7		---	24
25	EWH-2 (CONF. 1902)	50.1	N		9.0	50	1	A	30	3	N		6.3	30.4	FPB'S 2,11,12,14	26
27	EWH-2 (COPY/COFFEE 1905)	50.1	N		9.0	50	1	B		---	N		6.3		---	28
29	FUTURE INSTAHOT		N		9.0	50	1	C		---	N		6.3		---	30
31	EWH-1 (LOUNGE 1925)	20.3	N		1.0	15	3	A							SPACE	32
33	---		N		1.0		---	B							SPACE	34
35	---		N		1.0		---	C							SPACE	36
37	CRAC-T19.1	20.3	N		2.4	15	3	A	125	3	S		32.0	110.3	SUBFEED FNL L18 (EXIST BK	38
39	---		N		2.4		---	B		---	S		24.3		--- VIA 75 KVA XFR	40
41	---		N		2.4		---	C		---	S		26.7		---	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 100,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 400A MAIN CIRCUIT BRKR.

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ---->	22.0	125% OF LOAD	27	33
(R) RECEPT. ---->	79.8	NEC 220-13	45	54
(M) MOTOR ---->	1.9	NEC 430-24-(0.9)	2	3
(C) CONTINUOUS-->		125% OF LOAD		
(N) NON-CONT.---->	171.3	100% OF LOAD	171	206
(K) KITCHEN ---->		NEC 220-20 0%		
	275.1		246	296
WITH 20% SPARE	330.1		295	355

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY	PH	AMPS
	A	352
	B	320
	C	321
80% RATED PNL. DEMAND		
FACTORS		

ADDITIONAL PANEL FEATURES:
DOOR-IN-DOOR FRONT

BREAKER NOTES:

NOT FOR CONSTRUCTION

DATE ISSUED: 10-Jul-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

PNL- ELLS-17

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	L15 FSD'S	20.1	C		0.8	20	1	A	20	1	C		0.6		L18 FIRE MINIPLEX	2
3	L15 ELEC ROOM		R		0.4	20	1	B	20	1	C		1.2		L20, L18 FIRE NAC PNL	4
5	L15 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.1		L18 THRU L21 SD LOCK	6
7	L16 FSD'S	20.1	C		0.4	20	1	A	20	1	C		0.6		L16 FIRE NAC PNL	8
9	L16 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L20 HVAC CNTL PNL	10
11	L16 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L19 HVAC CNTL PNL	12
13	L17 FSD'S		C		1.4	20	1	A	20	1	C		0.5		L18 HVAC CNTL PNL	14
15	L17 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L17 HVAC CNTL PNL	16
17	L17 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L16 HVAC CNTL PNL	18
19	L18 FSD'S		C		1.0	20	1	A	20	1	C		0.5		L15 HVAC CNTL PNL	20
21	L18 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.7		L17 HVAC BDU	22
23	L18 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	24
25	L19 FSD'S		C		1.2	20	1	A	20	1					SPARE	26
27	L19 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	28
29	L19 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	30
31	L20 FSD'S		C			20	1	A	20	1					SPARE	32
33	L20 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	34
35	L20 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	36
37	SPACE							A							SPACE	38
39	SPACE							B							SPACE	40
41	SPACE							C							SPACE	42

VOLTAGE: 208Y/120V, 3P, 4W

I.E.R.: 10,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 100A MAIN CIRCUIT BRKR.

BUS SIZE: 100A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>		125% OF LOAD		
(R) RECEPT. ——>	4.3	NEC 220-13	4	12
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	38
(N) NON-CONT.---->		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	15.3		18	50
WITH 25% SPARE	19.1		23	62

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY

PH	AMPS
A	58
B	42
C	27

80% RATED PNL. DEMAND FACTORS

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	LEVEL 17 EMERGENCY LIGHT		L		1.2	20	1	A							SPACE	2
3	LEVEL 16 EMERGENCY LIGHT	20.1	L			20	1	B							SPACE	4
5	LEVEL 15 EMERGENCY LIGHT	20.1	L			20	1	C							SPACE	6
7	ELEV RM LEVEL 15		L			20	1	A							SPACE	8
9	SPARE					20	1	B							SPACE	10
11	SPARE					20	1	C							SPACE	12
13	SPARE					20	1	A							SPACE	14
15	SPARE					20	1	B							SPACE	16
17	SPARE					20	1	C							SPACE	18
19	SPARE					20	1	A							SPACE	20
21	SPARE					20	1	B							SPACE	22
23	SPARE					20	1	C							SPACE	24
25	SPARE					20	1	A							SPACE	26
27	SPARE					20	1	B							SPACE	28
29	SPARE					20	1	C							SPACE	30
31	SPACE							A							SPACE	32
33	SPACE							B							SPACE	34
35	SPACE							C							SPACE	36
37	SPACE							A		3	S		7.0		(E) SUBFEED PNL ELLS17	38
39	SPACE							B		—	S		5.1		— VIA XFR	40
41	SPACE							C		—	S		3.2		—	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 65,000A RMS SYM.

MOUNTING: SURFACE

MAINS: MAIN LUGS ONLY FROM 400A UPSTREAM OCP

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	1.2	125% OF LOAD	2	2
(R) RECEPT. ——>	4.3	NEC 220-13	4	5
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	17
(N) NON-CONT.——>		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	16.5		20	24
WITH 25% SPARE	20.6		24	29

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY PH	AMPS
A	30
B	18
C	12
80% RATED PNL. DEMAND FACTORS	

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED. 11-Aug-2000

Sep 22, ' 17:17:38

MSWB-TWR

SWDD SCHEDULE: MSWB TWR SCH

PANEL: MSWB TWR SCH	DC DEVICE TYPE: Fuse	ENCLOSURE: NEMA 1	MAINS(A): 5000	BUS RATING(A): 5000
LOCATION: B1 ELECTRICAL ROOM	DEVICE FAMILY: Bolt On	MOUNTING: Free Standing	WIRING: 3 PHASE 4 WIRE	BUS WITHSTAND(A):200000
FED FROM: 100000 COLLECT		VOLTAGE: 480		FAULT CURRENT(A):100789

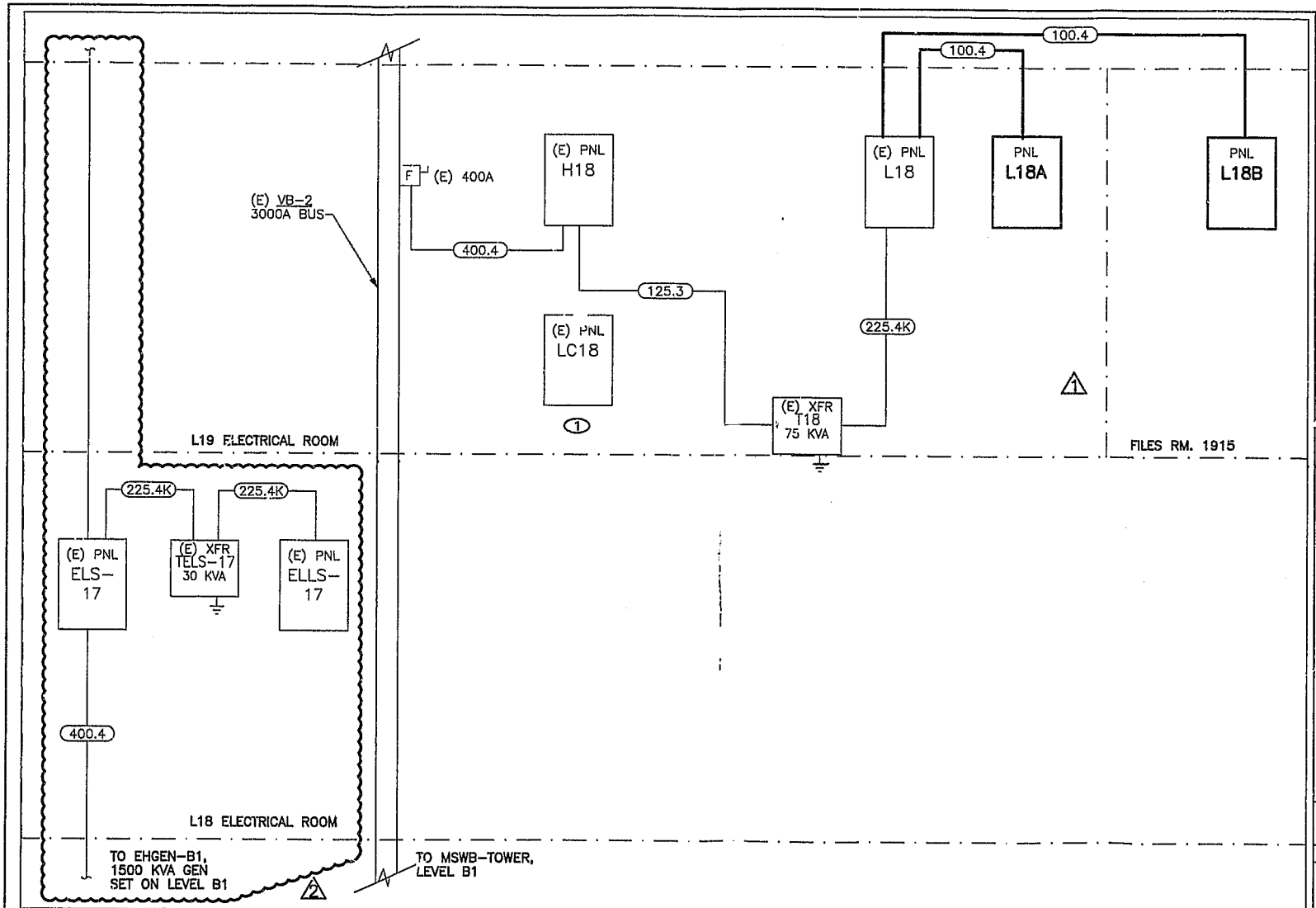
CUBICLE NO	DESCRIPTION	CONNECTED kVA	DEMAND kVA	DESIGN kVA	DESIGN AMPS	DC DEVICE TRIP SIZE	NOTES
1							
2	H-TOWER	191	185	205	247	1000	
3	VB-2 L16	1264	1232	1241	1493	3000	
4	VB-1 L1	1407	1354	1362	1639	3000	
5							
6							

SCHEDULE TOTALS	kVA	AMPS
TOTAL CONNECTED	2861.3	3441.8
TOTAL DEMAND	2545.6	3061.9
TOTAL DESIGN	2583.0	3107.0

BUS TOTALS	kVA
CONNECTED	2861.3
DEMAND	2545.6
DESIGN	2583.0

DATE: Sep 22, 1999
TIME: 17:17:39

GLUMAC



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GLUMAC INTERNATIONAL

ELECTRICAL ONE-LINE DIAGRAM

BLACK HELTERLINE T.I.
FOX TOWER, PORTLAND OR

Suppl. Drawing No.
RE-01

Date: 8/4/00

Ref. Dwg:
E5.1

LETTER OF TRANSMITTAL

August 7, 2000

To: **Mark Booth**
Zimmer Gunsul Frasca Partnership
320 S.W. Oak, Suite 500
Portland, OR 97204-2737
(503) 417-4318 Fax: (503) 224-2482

From: Kurt Hiland

rfc:
cc:

Project: Black Helterline
Project #: 200Z3006.A
Subject: Electrical Plan Review Comments

RECEIVED
AUG 08 2000
ZIMMER GUNSUL FRASCA

Enclosed	Via	For Your
☐ ORIGINALS	☑ MESSENGER	☐ USE
☐ PRINTS	☐ OVERNIGHT MAIL	☐ APPROVAL
☐ SPECIFICATIONS	☐ MAIL	☐ REVIEW/COMMENT
☐ SHOP DRAWINGS	☐ HAND	☑ DISTRIBUTION
☑ LETTER/MEMO	☐ _____	☐ _____
☐ SUBMITTALS		
☐ _____		

Enclosures

No. of Copies	Date	Description
1		Memo to Lee Hartfield
1		Panel schedule ELS-18
1		Panel schedule ELLS-18
1		MSWB-TWR schedule
1		Drawing RE-01

Remarks

Signature: Kurt Hiland

FPP-805 Black Helterline

Document1

MEMORANDUM

August 4, 2000

To: **Mr. Lee Hartfield**
1900 SW 4th Avenue, Suite 5000
Portland, OR 97201
Fax: 503-823-3983

From: Kurt Hiland

rfc:

cc: William Parry, Steffen Brocks

Project: Fox Tower Black Helterline T.I.

Project #: 200Z3006.A

Subject: Electrical Plan Review Corrections

☐ Record of Telephone Conversation on

☐ Mail Original

Here is our response to the correction items of July 31, 2000 for the Black Helterline T.I. Plans:

Item 1: The values for available fault current have been taken from the core & shell design. Fault current is 5,886A at panel L-18 and 65,561A at panel H-18.

Item 2: The numbers in the column "CONNECTED LOAD SUMMARY PH. AMPS" on the panel schedules are amps per phase *before* applying NEC demand factors. This information is used mainly for phase balancing.

Panel L18 sub-feeds two 100A panels and has a 225A bus. While the connected amps on panel L18 exceed 225A, the load types for L18 and its two sub-fed panels are almost entirely receptacle loads. The diversity taken on these receptacle loads per NEC 220-13 brings down the demand amps to 147A.

Item 3: Please refer to the attached schedule from the core & shell design for switchboard MSWB-TWR (provided by Dynalectric). Vertical bus VB-2 serves normal power from this switchboard to tenant levels 17 thru 27. According to this schedule, there is an existing demand of 1,232 kVA on VB-2 (core loads only). The new load on bus VB-2 for tenant level 19 is found on the attached schedule for panel H18.

Item 4: Please see attached RE-01 and panel schedules ELS-17 & ELLS-17.

H:\Jobs\200Z3006\Letters & Memos\Lee Hartfield - Electrical Plan Review Corrections.doc

PROJ/PHASE: ENTER PROJECT NAME AND PHASE OF CONSTRUCTION

EXISTING

PNL- H18

LOCATION: ELECTRICAL ROOM

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	(E) LIGHTING CORE		L		3.1	20	1	A	60	3	N		12.0	60.4	FPB'S 1,6,13,17 (EXIST BKR)	2
3	RELAY 1 (LC1) ZONE 1	20.1	L		3.6	20	1	B		---	N		12.0		---	4
5	RELAY 2 (LC1) ZONE 2	20.1	L		2.3	20	1	C		---	N		12.0		---	6
7	RELAY 3 (LC1) ZONE 3	20.1	L		3.1	20	1	A	60	3	N		10.7	60.4	FPB'S 5,10,16,20,21 (EXIST BK	8
9	RELAY 4 (LC1) ZONE 4	20.1	L		1.5	20	1	B		---	N		10.7		---	10
11	RELAY 5 (LC1) ZONE 5	20.1	L		3.2	20	1	C		---	N		10.7		---	12
13	RELAY 6 (LC1) ZONE 6	20.1	L		2.6	20	1	A	60	3	N		10.7	60.4	FPB'S 3,4,8,9,15 (EXIST BKR)	14
15	RELAY 7 (LC1) ZONE 7	20.1	L		2.5	20	1	B		---	N		10.7		---	16
17	SPARE					20	1	C		---	N		10.7		---	8
19	SPARE					20	1	A	30	3	N		4.7	30.4	FPB'S 7,18,19	20
21	SPARE					20	1	B		---	N		4.7		---	22
23	SPARE					20	1	C		---	N		4.7		---	24
25	EWH-2 (CONF. 1902)	50.1	N		9.0	50	1	A	30	3	N		6.3	30.4	FPB'S 2,11,12,14	26
27	EWH-2 (COPY/COFFEE 1905)	50.1	N		9.0	50	1	B		---	N		6.3		---	28
29	FUTURE INSTAHOT		N		9.0	50	1	C		---	N		6.3		---	30
31	EWH-1 (LOUNGE 1925)	20.3	N		1.0	15	3	A							SPACE	32
33	---		N		1.0		---	B							SPACE	34
35	---		N		1.0		---	C							SPACE	36
37	CRAC-T19.1	20.3	N		2.4	15	3	A	125	3	S		32.0	110.3	SUBFEED PNL L18 (EXIST BK	38
39	---		N		2.4		---	B		---	S		24.3		---- VIA 75 KVA XFR	40
41	---		N		2.4		---	C		---	S		26.7		---	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 100,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 400A MAIN CIRCUIT BRKR.

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ---->	22.0	125% OF LOAD	27	33
(R) RECEPT. ---->	79.8	NEC 220-13	45	54
(M) MOTOR ---->	1.9	NEC 430-24-(0.9)	2	3
(C) CONTINUOUS-->		125% OF LOAD		
(N) NON-CONT.---->	171.3	100% OF LOAD	171	206
(K) KITCHEN ---->		NEC 220-20 0%		
	275.1		246	296
WITH 20% SPARE	330.1		295	355

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY

PH	AMPS
A	352
B	320
C	321

80% RATED PNL. DEMAND FACTORS

ADDITIONAL PANEL FEATURES:
DOOR-IN-DOOR FRONT

BREAKER NOTES:

NOT FOR CONSTRUCTION

DATE ISSUED: 10-Jul-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELLS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	L15 FSD'S	20.1	C		0.8	20	1	A	20	1	C		0.6		L18 FIRE MINIPLEX	2
3	L15 ELEC ROOM		R		0.4	20	1	B	20	1	C		1.2		L20, L18 FIRE NAC PNL	4
5	L15 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.1		L18 THRU L21 SD LOCK	6
7	L16 FSD'S	20.1	C		0.4	20	1	A	20	1	C		0.6		L16 FIRE NAC PNL	8
9	L16 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L20 HVAC CNTL PNL	10
11	L16 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L19 HVAC CNTL PNL	12
13	L17 FSD'S		C		1.4	20	1	A	20	1	C		0.5		L18 HVAC CNTL PNL	14
15	L17 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L17 HVAC CNTL PNL	16
17	L17 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L16 HVAC CNTL PNL	18
19	L18 FSD'S		C		1.0	20	1	A	20	1	C		0.5		L15 HVAC CNTL PNL	20
21	L18 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.7		L17 HVAC BDU	22
23	L18 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	24
25	L19 FSD'S		C		1.2	20	1	A	20	1					SPARE	26
27	L19 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	28
29	L19 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	30
31	L20 FSD'S		C			20	1	A	20	1					SPARE	32
33	L20 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	34
35	L20 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	36
37	SPACE							A							SPACE	38
39	SPACE							B							SPACE	40
41	SPACE							C							SPACE	42

VOLTAGE: 208Y/120V, 3P, 4W

I.E.R.: 10,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 100A MAIN CIRCUIT BRKR.

BUS SIZE: 100A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>		125% OF LOAD		
(R) RECEPT. ——>	4.3	NEC 220-13	4	12
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	38
(N) NCN-CONT.---->		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	15.3		18	50
WITH 25% SPARE	19.1		23	62

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY	
PH	AMPS
A	58
B	42
C	27

80% RATED PNL. DEMAND FACTORS

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B AMP	C.B POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	LEVEL 17 EMERGENCY LIGHT		L		1.2	20	1	A							SPACE	2
3	LEVEL 16 EMERGENCY LIGHT	20.1	L			20	1	B							SPACE	4
5	LEVEL 15 EMERGENCY LIGHT	20.1	L			20	1	C							SPACE	6
7	ELEV RM LEVEL 15		L			20	1	A							SPACE	8
9	SPARE					20	1	B							SPACE	10
11	SPARE					20	1	C							SPACE	12
13	SPARE					20	1	A							SPACE	14
15	SPARE					20	1	B							SPACE	16
17	SPARE					20	1	C							SPACE	18
19	SPARE					20	1	A							SPACE	20
21	SPARE					20	1	B							SPACE	22
23	SPARE					20	1	C							SPACE	24
25	SPARE					20	1	A							SPACE	26
27	SPARE					20	1	B							SPACE	28
29	SPARE					20	1	C							SPACE	30
31	SPACE							A							SPACE	32
33	SPACE							B							SPACE	34
35	SPACE							C							SPACE	36
37	SPACE							A		3	S		7.0		(E) SUBFEED PNL ELLS17	38
39	SPACE							B		—	S		5.1		— VIA XFR	40
41	SPACE							C		—	S		3.2		—	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 65,000A RMS SYM.

MOUNTING: SURFACE

MAINS: MAIN LUGS ONLY FROM 400A UPSTREAM OCP

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	1.2	125% OF LOAD	2	2
(R) RECEPT. ——>	4.3	NEC 220-13	4	5
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS—>	11.0	125% OF LOAD	14	17
(N) NON-CONT.——>		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	16.5		20	24
WITH 25% SPARE	20.6		24	29

CONN. LOAD SUMMARY

PH	AMPS
A	30
B	18
C	12

80% RATED PNL. DEMAND

FACTORS

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

Sep 22, 17:17:39

MSWB-TWR

SWBD SCHEDULE: MSWB TWR SCH

PANEL: MSWB TWR SCH	OC DEVICE TYPE: Fuse	ENCLOSURE: NEMA 1	MAINS[A]: 5000	BUS RATING[A]: 5000
LOCATION: B1 ELECTRICAL ROOM	DEVICE FAMILY: Bolt On	MOUNTING: Free Standing	WIRING: 3 PHASE 4 WIRE	BUS WITHSTAND[A]:200000
FED FROM: 100000 COLLECT		VOLTAGE: 480		FAULT CURRENT[A]:108789

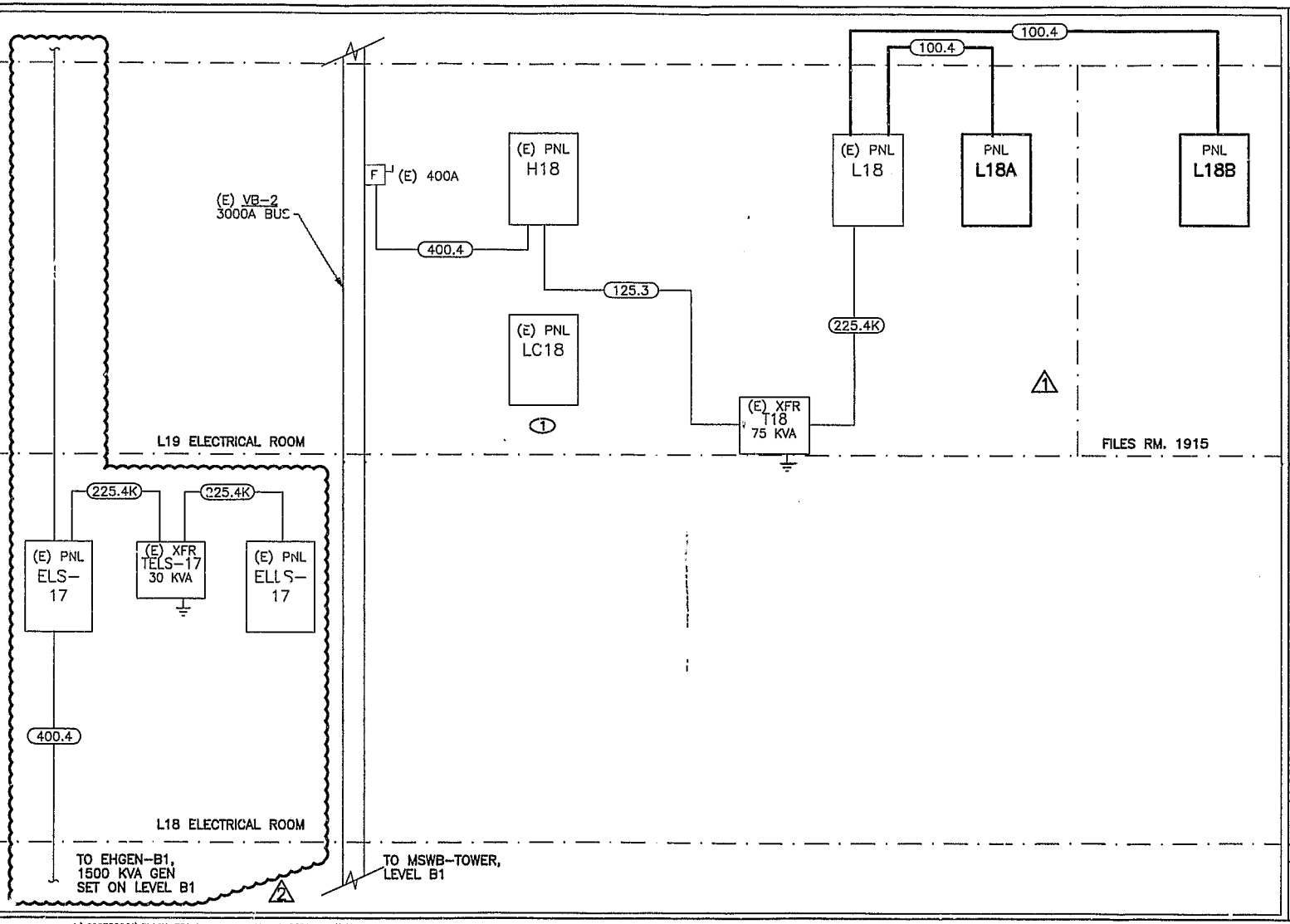
CUBICLE NO	DESCRIPTION	CONNECTED kVA	DEMAND kVA	DESIGN kVA	DESIGN AMPS	OC DEVICE TRIP SIZE	NOTES
1							
2	H-TOWER	191	185	205	247	1000	
3	VB-2 L16	1254	1232	1241	1493	3000	
4	VB-1 L1	1407	1354	1362	1639	3000	
5							
6							

SCHEDULE TOTALS	KVA	AMPS
TOTAL CONNECTED	2861.3	3441.8
TOTAL DEMAND	2545.6	3061.9
TOTAL DESIGN	2583.0	3107.0

BUS TOTALS	KVA
CONNECTED	2861.3
DEMAND	2545.6
DESIGN	2583.0

DATE: Sep 22, 1999
TIME: 17:17:39

GLUMAC



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GLUMAC INTERNATIONAL

ELECTRICAL ONE-LINE DIAGRAM

BLACK HELTERLINE T.I.

FOX TOWER, PORTLAND OR

Suppl. Drawing No.

RE-01

Date: 8/4/00

Ref. Dwg:

E5.1

LETTER OF TRANSMITTAL

August 7, 2000

To: **Mark Booth**
Zimmer Gunsul Frasca Partnership
320 S.W. Oak, Suite 500
Portland, OR 97204-2737
(503) 417-4318 Fax: (503) 224-2482

From: Kurt Hiland

rfc:
cc:

RECEIVED
AUG 0 8 2000
ZIMMER GUNSUL FRASCA

Project: Black Helterline
Project #: 200Z3006.A
Subject: Electrical Plan Review Comments

Enclosed	Via	For Your
☐ ORIGINALS	☑ MESSENGER	☐ USE
☐ PRINTS	☐ OVERNIGHT MAIL	☐ APPROVAL
☐ SPECIFICATIONS	☐ MAIL	☐ REVIEW/COMMENT
☐ SHOP DRAWINGS	☐ HAND	☑ DISTRIBUTION
☑ LETTER/MEMO	☐ _____	☐ _____
☐ SUBMITTALS		
☐ _____		

Enclosures

No. of Copies	Date	Description
1		Memo to Lee Hartfield
1		Panel schedule ELS-18
1		Panel schedule ELLS-18
1		MSWB-TWR schedule
1		Drawing RE-01

Remarks

Signature: Kurt Hiland

FPP-805 BlackHelterline

Document1

MEMORANDUM

August 4, 2000

To: **Mr. Lee Hartfield**
1900 SW 4th Avenue, Suite 5000
Portland, OR 97201
Fax: 503-823-6983

From: Kurt Hiland

rfc:

cc: William Parry, Steffen Brocks

Project: Fox Tower Black Helterline T.I.
Project #: 200Z3006.A
Subject: Electrical Plan Review Corrections

☐ Record of Telephone Conversation on
☐ Mail Original

Here is our response to the correction items of July 31, 2000 for the Black Helterline T.I. Plans:

Item 1: The values for available fault current have been taken from the core & shell design. Fault current is 5,886A at panel L-18 and 65,561A at panel H-18.

Item 2: The numbers in the column "CONNECTED LOAD SUMMARY PH. AMPS" on the panel schedules are amps per phase *before* applying NEC demand factors. This information is used mainly for phase balancing.

Panel L18 sub-feeds two 100A panels and has a 225A bus. While the connected amps on panel L18 exceed 225A, the load types for L18 and its two sub-fed panels are almost entirely receptacle loads. The diversity taken on these receptacle loads per NEC 220-13 brings down the demand amps to 147A.

Item 3: Please refer to the attached schedule from the core & shell design for switchboard MSWB-TWR (provided by Dynalectric). Vertical bus VB-2 serves normal power from this switchboard to tenant levels 17 thru 27. According to this schedule, there is an existing demand of 1,232 kVA on VB-2 (core loads only). The new load on bus VB-2 for tenant level 19 is found on the attached schedule for panel L18.

Item 4: Please see attached RE-01 and panel schedules ELS-17 & ELLS-17.

CONSULTING ENGINEERS / MECHANICAL ELECTRICAL ACOUSTICAL ENERGY TELECOMMUNICATIONS
GLUMAC INTERNATIONAL / 320 SW Washington, Suite 200 / Portland, OR 97204 / TEL 503.227.5280 FAX 503.274.7674

PROJ/PHASE: ENTER PROJECT NAME AND PHASE OF CONSTRUCTION

EXISTING

LOCATION: ELECTRICAL ROOM

PNL- H18

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	(E) LIGHTING CORE		L		3.1	20	1	A	60	3	N		12.0	60.4	FPB'S 1,6,13,17 (EXIST BKR)	2
3	RELAY 1 (LC1) ZONE 1	20.1	L		3.6	20	1	B		---	N		12.0		---	4
5	RELAY 2 (LC1) ZONE 2	20.1	L		2.3	20	1	C		---	N		12.0		---	6
7	RELAY 3 (LC1) ZONE 3	20.1	L		3.1	20	1	A	60	3	N		10.7	60.4	FPB'S 5,10,16,20,21 (EXIST BK	8
9	RELAY 4 (LC1) ZONE 4	20.1	L		1.5	20	1	B		---	N		10.7		---	10
11	RELAY 5 (LC1) ZONE 5	20.1	L		3.2	20	1	C		---	N		10.7		---	12
13	RELAY 6 (LC1) ZONE 6	20.1	L		2.6	20	1	A	60	3	N		10.7	60.4	FPB'S 3,4,8,9,15 (EXIST BKR)	14
15	RELAY 7 (LC1) ZONE 7	20.1	L		2.5	20	1	B		---	N		10.7		---	16
17	SPARE					20	1	C		---	N		10.7		---	18
19	SPARE					20	1	A	30	3	N		4.7	30.4	FPB'S 7,18,19	20
21	SPARE					20	1	B		---	N		4.7		---	22
23	SPARE					20	1	C		---	N		4.7		---	24
25	EWH-2 (CONF. 1902)	50.1	N		9.0	50	1	A	30	3	N		6.3	30.4	FPB'S 2,11,12,14	26
27	EWH-2 (COPY/COFFEE 1905)	50.1	N		9.0	50	1	B		---	N		6.3		---	28
29	FUTURE INSTAHOT		N		9.0	50	1	C		---	N		6.3		---	30
31	EWH-1 (LOUNGE 1925)	20.3	N		1.0	15	3	A							SPACE	32
33	---		N		1.0		---	B							SPACE	34
35	---		N		1.0		---	C							SPACE	36
37	CRAC-T19.1	20.3	N		2.4	15	3	A	125	3	S		32.0	110.3	SUBFEED PNL L18 (EXIST BK	38
39	---		N		2.4		---	B		---	S		24.3		--- VIA 75 KVA XFR	40
41	---		N		2.4		---	C		---	S		26.7		---	42

VOLTAGE: **480Y/277V, 3P, 4W**

I.E.R.: **100,000A RMS SYM.**

MOUNTING: **SURFACE**

MAINS: **400A MAIN CIRCUIT BRKR.**

BUS SIZE: **400A**

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	22.0	125% OF LOAD	27	33
(R) RECEPT. ——>	79.8	NEC 220-13	45	54
(M) MOTOR ——>	1.9	NEC 430-24-(0.9)	2	3
(C) CONTINUOUS-->		125% OF LOAD		
(N) NON-CONT.——>	171.3	100% OF LOAD	171	236
(K) KITCHEN ——>		NEC 220-20 0%		
	275.1		246	296
WITH 20% SPARE	330.1		295	355

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY PH	AMPS
A	352
B	320
C	321
80% RATED PNL. DEMAND	
FACTORS	

ADDITIONAL PANEL FEATURES:
DOOR-IN-DOOR FRONT

BREAKER NOTES:

NOT FOR CONSTRUCTION

DATE ISSUED: **10-Jul-2000**

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELLS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	L15 FSD'S	20.1	C		0.8	20	1	A	20	1	C		0.6		L18 FIRE MINIPLEX	2
3	L15 ELEC ROOM		R		0.4	20	1	B	20	1	C		1.2		L20, L18 FIRE NAC PNL	4
5	L15 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.1		L18 THRU L21 SD LOCK	6
7	L16 FSD'S	20.1	C		0.4	20	1	A	20	1	C		0.6		L16 FIRE NAC PNL	8
9	L16 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L20 HVAC CNTL PNL	10
11	L16 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L19 HVAC CNTL PNL	12
13	L17 FSD'S		C		1.4	20	1	A	20	1	C		0.5		L18 HVAC CNTL PNL	14
15	L17 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.5		L17 HVAC CNTL PNL	16
17	L17 TELE/DATA ROOM		R		0.4	20	1	C	20	1	C		0.5		L16 HVAC CNTL PNL	18
19	L18 FSD'S		C		1.0	20	1	A	20	1	C		0.5		L15 HVAC CNTL PNL	20
21	L18 ELEC ROOM		R		0.4	20	1	B	20	1	C		0.7		L17 HVAC BDU	22
23	L18 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	24
25	L19 FSD'S		C		1.2	20	1	A	20	1					SPARE	26
27	L19 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	28
29	L19 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	30
31	L20 FSD'S		C			20	1	A	20	1					SPARE	32
33	L20 ELEC ROOM		R		0.4	20	1	B	20	1					SPARE	34
35	L20 TELE/DATA ROOM		R		0.4	20	1	C	20	1					SPARE	36
37	SPACE							A							SPACE	38
39	SPACE							B							SPACE	40
41	SPACE							C							SPACE	42

VOLTAGE: 208Y/120V, 3P, 4W

I.E.R.: 10,000A RMS SYM.

MOUNTING: SURFACE

MAINS: 100A MAIN CIRCUIT BRKR.

BUS SIZE: 100A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>		125% OF LOAD		
(R) RECEPT. ——>	4.3	NEC 220-13	4	12
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	38
(N) NON-CONT.——>		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	15.3		18	50
WITH 25% SPARE	19.1		23	62

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

CONN. LOAD SUMMARY PH	AMPS
A	58
B	42
C	27
80% RATED PNL. DEMAND FACTORS	

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

PROJ/PHASE: FOX TOWER COLLEGENET T.I.

EXISTING

LOCATION: TENANT LEVEL 18 ELECTRICAL ROOM

PNL- ELS-17

POLE NO.	LOAD SERVED	CKT SIZE	LOAD TYPE	LOAD HP.	LOAD KVA	C.B. AMP	C.B. POLE	PH	C.B. AMP	C.B. POLE	LOAD TYPE	LOAD HP.	LOAD KVA	CKT SIZE	LOAD SERVED	POLE NO.
1	LEVEL 17 EMERGENCY LIGHT		L		1.2	20	1	A							SPACE	2
3	LEVEL 16 EMERGENCY LIGHT	20.1	L			20	1	B							SPACE	4
5	LEVEL 15 EMERGENCY LIGHT	20.1	L			20	1	C							SPACE	6
7	ELEV RM LEVEL 15		L			20	1	A							SPACE	8
9	SPARE					20	1	B							SPACE	10
11	SPARE					20	1	C							SPACE	12
13	SPARE					20	1	A							SPACE	14
15	SPARE					20	1	B							SPACE	16
17	SPARE					20	1	C							SPACE	18
19	SPARE					20	1	A							SPACE	20
21	SPARE					20	1	B							SPACE	22
23	SPARE					20	1	C							SPACE	24
25	SPARE					20	1	A							SPACE	26
27	SPARE					20	1	B							SPACE	28
29	SPARE					20	1	C							SPACE	30
31	SPACE							A							SPACE	32
33	SPACE							B							SPACE	34
35	SPACE							C							SPACE	36
37	SPACE							A		3	S		7.0		(E) SUBFEED PNL ELLS17	38
39	SPACE							B		—	S		5.1		— VIA XFR	40
41	SPACE							C		—	S		3.2		—	42

VOLTAGE: 480Y/277V, 3P, 4W

I.E.R.: 65,000A RMS SYM.

MOUNTING: SURFACE

MAINS: MAIN LUGS ONLY FROM 400A UPSTREAM OCP

BUS SIZE: 400A

LOAD TYPE	CONN. KVA	DEMAND FACTOR	DEMAND KVA	DEMAND AMPS
(L) LIGHTING ——>	1.2	125% OF LOAD	2	2
(R) RECEPT. ——>	4.3	NEC 220-13	4	5
(M) MOTOR ——>		NEC 430-24-(0.0)		
(C) CONTINUOUS-->	11.0	125% OF LOAD	14	17
(N) NON-CONT.——>		100% OF LOAD		
(K) KITCHEN ——>		NEC 220-20 0%		
	16.5		20	24
WITH 25% SPARE	20.6		24	29

CONN. LOAD SUMMARY PH	AMPS
A	30
B	18
C	12
80% RATED PNL. DEMAND FACTORS	

S = LOADS FROM SUBFED PANEL/MCC XFR = SIZE PER XFR SCHED.

ADDITIONAL PANEL FEATURES:

BREAKER NOTES:

ISSUED FOR BID/PERMIT

DATE ISSUED: 11-Aug-2000

Sep 22, 1999 17:17:39

MSWB-TWR

SWBD SCHEDULE: MSWB TWR SCH

PANEL: MSWB TWR SCH	OC DEVICE TYPE: Fuse	ENCLOSURE: NEMA 1	MAINS(A): 5000	BUS RATING(A): 5000
LOCATION: B1 ELECTRICAL ROOM	DEVICE FAMILY: Bolt On	MOUNTING: Free Standing	WIRING: 3 PHASE 4 WIRE	BUS WITHSTAND(A): 200000
FED FROM: 100000 COLLECT		VOLTAGE: 480		FAULT CURRENT(A): 108789

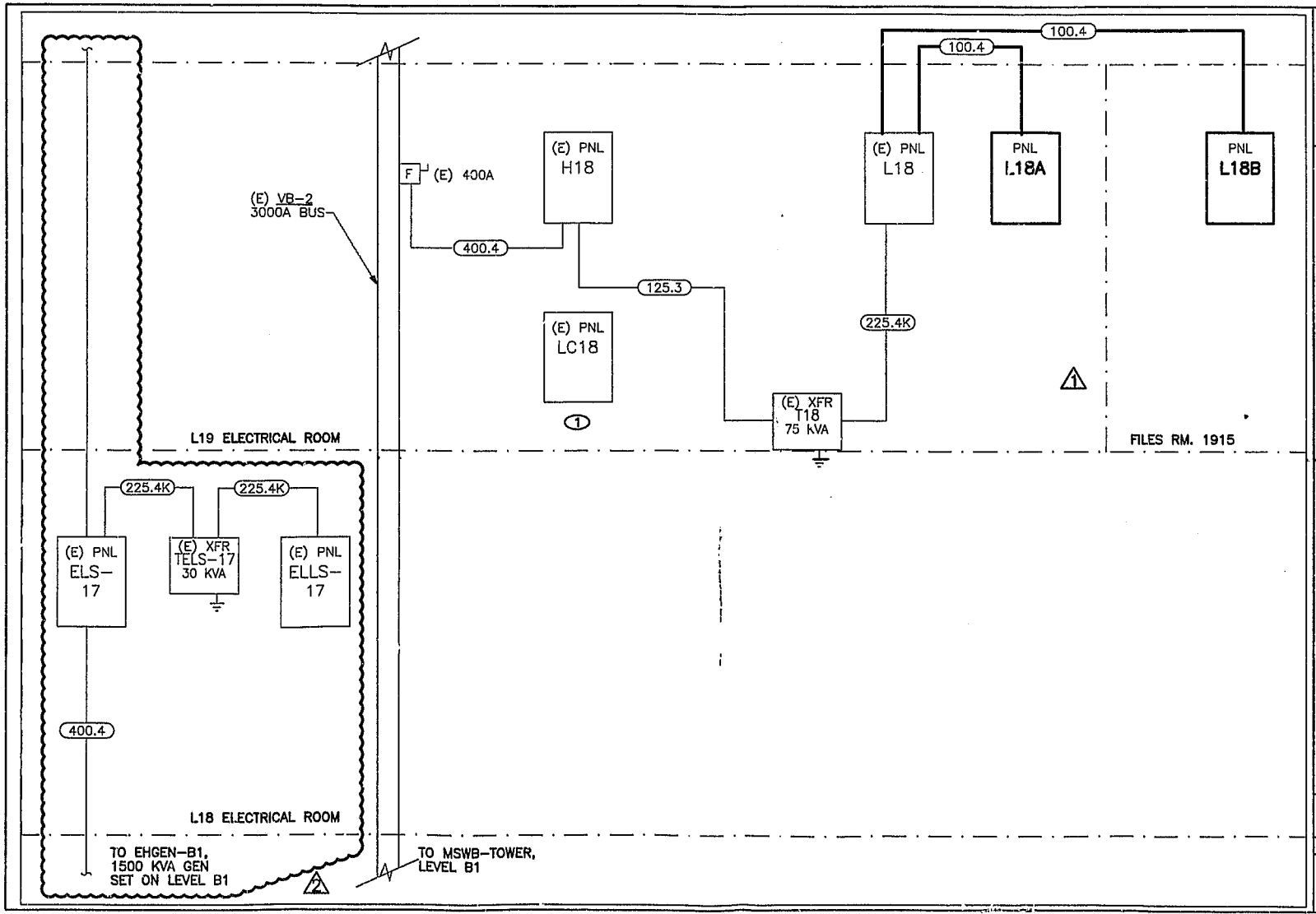
CUBICLE NO	DESCRIPTION	CONNECTED kVA	DEMAND kVA	DESIGN kVA	DESIGN AMPS	OC DEVICE TRIP SIZE	NOTES
1							
2	H-TOWER	191	195	205	247	1000	
3	VB-2 L16	1264	1232	1241	1493	3000	
4	VB-1 L1	1407	1354	1362	1639	3000	
5							
6							

SCHEDULE TOTALS	KVA	AMPS
TOTAL CONNECTED	2861.3	3441.8
TOTAL DEMAND	2545.6	3061.9
TOTAL DESIGN	2583.0	3107.0

BUS TOTALS	KVA
CONNECTED	2861.3
DEMAND	2545.6
DESIGN	2583.0

DATE: Sep 22, 1999
TIME: 17:17:39

GLUMAC



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GLUMAC INTERNATIONAL

ELECTRICAL ONE-LINE DIAGRAM

BLACK HELTERLINE T.I.

FOX TOWER, PORTLAND OR

Suppl. Drawing No.

RE-01

Date: 8/4/00

Ref. Dwg:

E5.1

Architecture/Planning/Interior Design

ZIMMER GUNSUL FRASCA PARTNERSHIP
320 S.W. Oak Suite 500 Portland, Oregon 97204
Office: 503/224-3860 Fax: 503/224-2482

TRANSMITTAL NOTICE

ROY DAVIDSON) KARL PFEIFER
FACILITIES PERMIT PROGRAM
OFFICE OF PLANNING & DEVELOPMENT REVIEW
CITY OF PORTLAND
1900 SW 4TH AVENUE
PORTLAND, OR 97204

DATE: August 8, 2000
PROJECT NO.: P71147.01
PROJECT NAME: Black Helterline L.L.P.

TRANSMITTED HEREWITH:

NO. OF COPIES	DATED	TITLE
4		Transmittal from Glumac: Panel Schedule Revisions

REMARKS:

Re: FPP #805-Black Helterline ; Application No. 00-154893FA

This submission duplicates information previously sent to Lee Hartfield by Glumac, in response to permit correction items list.

cc w/enclosure: Bill Drinkward/Hoffman
cc w/o enclosure: Sarah Gary/Black Helterline ; Dale Pearce/TMT

IF ENCLOSURES RECEIVED ARE NOT AS LISTED ABOVE, KINDLY NOTIFY AT ONCE.

MASTER FILE w/o encl.
ROUTING

BY: _____
Mark E. Booth
Associate Partner

Architecture/Planning/Interior Design

ZIMMER GUNSUL FRASCA PARTNERSHIP
320 S.W. Oak Suite 500 Portland, Oregon 97204
Office: 503/224-3860 Fax: 503/224-2482

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DATE: **August 8, 2000**
PROJECT NO.: **P71147.01**
PROJECT NAME: **Black Helterline L.L.P.**

TRANSMITTED HEREWITH:

NO. OF COPIES	DATED	TITLE
4		Electrical Sheets E1.1, E1.2: Outlet Deletions and Associated Panel Revisions

Attach addendum to plan set(s) as they are returned.

REMARKS:

Re: FPP #805-Black Helterline ; Application No. 00-154893FA

cc w/enclosure: Bill Drinkward/Hoffman; Sarah Gary/Black Helterline
cc w/o enclosure: Dale Pearce/TMT

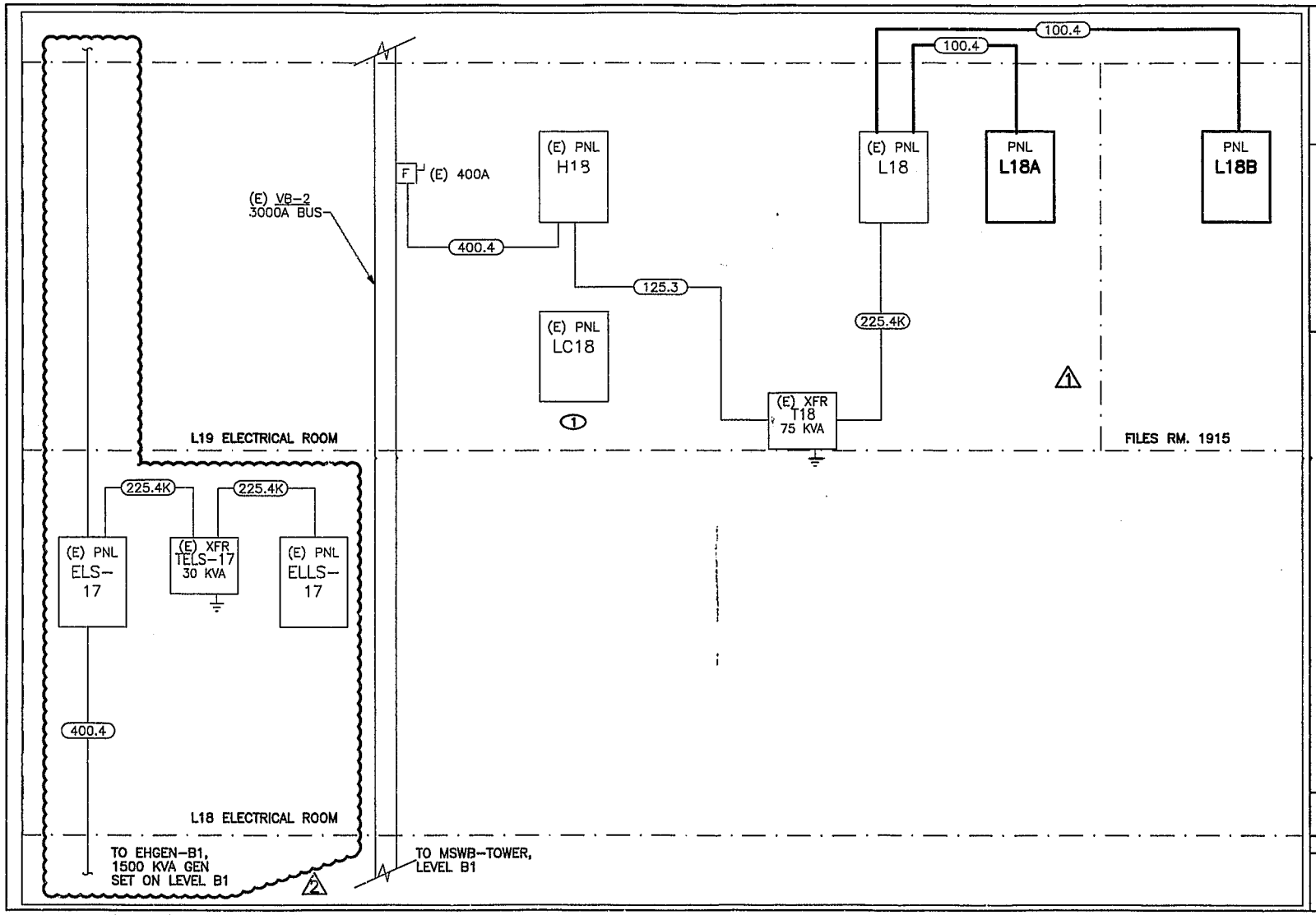
00-154893 FA

IF ENCLOSURES RECEIVED ARE NOT AS LISTED ABOVE, KINDLY NOTIFY AT ONCE.

MASTER FILE w/o encl.
ROUTING

BY: _____
Mark E. Booth
Associate Partner

8A4



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GLUMAC INTERNATIONAL

ELECTRICAL ONE-LINE DIAGRAM

BLACK HELTERLINE T.I.

FOX TOWER, PORTLAND OR

Suppl. Drawing No.
RE-01

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E5.1